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AN HISTORICAL REVIEW OF THE LEGAL ASPECTS OF THE USE OF FOOD FISH FOR REDUCTION PURPOSES.

By B. D. MARX GREENE,

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It seems repugnant to every right-thinking citizen to see fresh food fish used for any purpose other than human consumption. This attitude, accentuated by certain conditions in the wholesale fresh fish market, caused the legislature in 1917 to pass an act giving the state market director power to fix wholesale and retail prices on fish and to

forbid the use of fish by market fishermen for any purpose other than human consumption, except by permission of the director. This statute was tested in court in the case of *Paladini vs. Superior Court*, 178 Cal. 369, and its constitutionality was upheld.

This act, however, applied only to market fishermen and did not affect canneries. The abuse by certain canneries becoming acute, the legislature finally took cognizance of this situation and adopted an act in 1919 to control the use of food fish by other than market fishermen in the manufacture of fertilizer and fish oil. This act provided, in brief, that no cannery should use any fish for reduction purposes without first having written permission of the Fish and Game Commission, and no reduction plant should receive any fish for such purposes from any person who did not have such written permission. A further clause in the statute prohibited any cannery from handling or receiving more fish than such concern could actually use without preventable deterioration, waste, or spoilage.

This act as originally passed did not work out very well because it was too difficult for the Commission to determine what was unavoidable waste. Too much discretion had to be vested in the local branch offices of the Commercial Fisheries Department at Monterey, San Pedro and San Diego. Therefore, at the legislative session of 1921 an amendment (Stats. 1921, p. 459) was made to the act, which provided that the Commission could not allow any canner to use for reduction purposes more than 25 per cent of the amount which any such canner could can or pack or preserve for human food during a calendar month. A meeting must be held by the Commission prior to granting such permission and a showing be made by the canner that there was no market for such surplus of fish, and that the taking of such fish and the use of same in the reduction plant would not tend to impair or deplete the species.

The first litigation arising under the amended act was in the nature of an action brought in the superior court of Los Angeles County by the people of the State of California at the request of the Fish and Game Commission against the Stafford Packing Company of San Pedro. The complaint alleged that the defendant, upon its application and after a hearing, was granted a permit to use sardines for the manufacture of fish oil, fish meal, and fertilizer during the time that it was packing sardines for human food purposes only, provided that the amount so used was not to exceed 25 per cent of the total amount of sardines received at the packing plant of the defendant during a calendar month. It alleged that during the month of January, 1923, the defendant used fresh sardines for food canning purposes at its reduction plant in excess of the amount allowed under its permit and in violation of the provisions of law. It further alleged that the defendant threatened to continue such unlawful use "thereby causing great and irreparable loss and damage to the people of the State of California." Affidavits were filed showing that during the month of January the defendant had converted 88.06 per cent of all sardines received by it into fish meal and fish oil.

In the superior court judgment was rendered for the plaintiff. This was reversed by the District Court of Appeal, Second District, Division Two (42 Cal. App. Dec. 726). A hearing was granted by the Supreme

Court and the judgment of the District Court of Appeal was reversed and the superior court sustained (193 Cal. 719). The decision of the Supreme Court sets up certain fundamental legal principles which have been a guide to us in a great many of our subsequent proceedings. The court held that the facts alleged and proved supported, *prima facie*, the conclusions that irreparable injury was threatened and that the remedy at law was inadequate. The court further held that the **general right and ownership of the fish is in the people of the state** and the state has the right to regulate and control the taking and disposition thereof; and in such action the acts of the defendant constituted a public nuisance and an invasion of the property rights of the people which were held by the state for the people of the state, and formed a sufficient basis for an injunction to restrain the Commission for such acts.

In this decision the court used this precise language which has been of great use to us:

If this defendant may thus violate the law with impunity, every other packer may do likewise and would naturally be tempted to do so. Appellant asks us to take judicial notice of the fact that the supply of fish in the Pacific Ocean is inexhaustible. If we are authorized to take judicial cognizance upon this subject, we should have to conclude that experience has proven that the available supply of food fish in the ocean in waters *readily accessible* to the packing plants of the state may be seriously depleted, if not practically exhausted, within a period of a few years by unrestricted fishing.

The Court also upheld the constitutionality of all of the provisions of the reduction act as amended. This decision was rendered on June 5, 1924.

In December, 1924, the act again underwent legal fire. An independent reduction plant at Monterey, unconnected with any cannery, commenced to send boats out to sea and bring in fish for the sole purpose of making fish meal and fish oil. An action was brought by the people of the state at the request of the Fish and Game Commission to secure an injunction. The Monterey County superior court held for the defendant. An immediate appeal was taken to the Supreme Court and very promptly, on March 4, 1925, the Supreme Court reversed the Monterey court on every finding and enunciated certain principles on the law of conservation which have now become historic and are quoted liberally throughout the United States. The case is entitled *People vs. Monterey Fish Products Co.*, and is reported in 69 Cal. Dec. 261. As the case is of such paramount importance I shall quote from it copiously:

It is respondent's contention that this act and particularly section 5 thereof, is unconstitutional, for the reason that it excludes every one except those who are engaged in taking, catching, dealing in, packing or preserving fish or fish products for human consumption, from the privilege of using any such fish in a reduction plant, and at the same time it expressly provides for the granting of such privilege to these favored classes. Respondent argues that there exists no natural, constitutional or intrinsic basis for this classification and that the same is, therefore, arbitrary, unreasonable and discriminatory and constitutes special legislation, violating the prohibition of both the state and federal constitutions.

It may be doubted that these objections, which apply only to the proviso contained in the statute would, if well founded, be of any avail to respondent herein. The general provisions of the act in question purport to prohibit all

persons from using fish fit for human consumption (except fish offal) for reduction purposes. The proviso purports to except to a limited extent certain classes of persons from the operation of the general prohibition, upon the conditions therein specified. It may be argued with much reason that if the exception thus attempted be invalid because of its arbitrary and discriminatory character the result thereof would be to annul the exception, leaving the general prohibitory provisions of the act unimpaired. This result would in no way improve respondent's position.

(1) The general rule is that when a proviso in the nature of an exception to a general statute is invalid, the general provisions of the statute are not invalidated thereby, unless it clearly appears that the provisions of the exception are so intimately and inherently related to and connected with the general provisions to which it relates that the legislature would not have enacted the latter without the former (5 Cal. Juris., sec. 655 et seq., and cases cited). Counsel for respondent have advanced no reasons for the adoption of such a conclusion with respect to the statute here under consideration. However, we are not disposed to hold that the exception now under consideration is discriminatory or unreasonable.

(2) When a legislative enactment is attacked upon this ground all presumptions and intendments are in favor of the reasonableness and fairness of the legislative action (5 Cal. Juris., sec. 628 et seq., and cases cited), and the decision of the legislature as to what is a sufficient distinction to warrant the classification will not be overthrown by the courts unless it is palpably arbitrary (Id., sec. 832 et seq., and cases cited).

(3) The public policy of this state in its relation to the food fish within its waters has been clearly, consistently and unmistakably manifested throughout the history of its fish and game legislation. It aims at the protection and conservation of food fish for the benefit of the present and future generations of the people of the state and the devotion of such fish to the purposes of human consumption. In confirmation thereof we need only refer to the provisions of the act of 1919 and the amendment thereof in 1921, supra, and to the provisions of the act of 1917, relied upon by respondent herein (Stats. 1917, p. 1673).

(4) It is plain that the purpose and intent of both of these acts is to prohibit preventable waste of food fish, to discourage, and so far as practicable to prevent, the use thereof for any purpose other than human consumption and to affirmatively encourage the use thereof for this purpose.

(5) With this item of public policy in mind it is apparent that the purpose of the proviso which is here claimed to be unreasonable and discriminatory is to aid and encourage those who are engaged in catching and preparing fish for human consumption, and that no reason exists for the giving of such aid and encouragement to those who are engaged in diverting food fish to other uses. It is to the interest of the people of the state that the packing plants engaged in the packing and preparing of fish for human consumption shall be operated efficiently and economically, so that the price of their product to the consumer thereof may be kept down. A packing plant can be operated most efficiently and economically when it is enabled to operate steadily at a constant rate of output approaching its maximum capacity. But when the fishermen start out to make a catch no one can foretell with exactitude the size of the catch which they will take. Therefore, in order to insure so far as practicable that the catch for each day shall approximate the capacity of the packing plant the act provides that the fish and game commission may, after a hearing, give the packer a permit which will enable him to engage for the taking of a specified quantity of fish in excess of his packing capacity, and upon occasions when such excess quantity is brought in to use the same for reduction purposes.

(6) The purpose of this is to allow the packer a certain leeway or margin of safety to enable him so far as practicable to operate his packing plant regularly and at capacity. There is no reason for allowing to the operator of a reduction plant, who is not packing fish for human consumption, any margin or leeway whatsoever, because he is forbidden to take any fish fit for human consumption for use in his reduction plant. This presents to our mind a reasonable and natural basis for the distinction made in the act between the two classes of operators and it is not necessary to discuss the other reasons

therefor which are suggested by counsel for appellant. There is no merit in the claim of respondent that the effect of this act is to prohibit the legitimate business of conducting a reduction plant by one who is not engaged in packing fish for human consumption.

(7) The act does not prohibit the operation of a reduction plant, nor does it prohibit the use of fish therein not fit for human consumption or of fish offal. It prohibits only the use in such a plant of fish fit for human consumption. If the respondent is in fact engaged in a legitimate business it is not prohibited by this act from continuing the same. On the other hand, if respondent is engaged in the taking and use in its reduction plant of fish fit for human consumption, it is violating the law and is not engaged in legitimate business. There is no merit in the contention that the act is invalid for the reason that it purports to vest in the commission arbitrary authority and unguided discretion in that it may allow one canner to take twenty-five per cent and another five per cent and another one per cent of excess fish.

(8) The act confers discretion upon the commission, it is true, but such discretion is neither unguided nor uncontrolled. Its exercise is made dependent upon the findings of fact after a hearing "that there is no market for the fish referred to in said application and that the taking or using of said fish in a reduction plant will not tend to impair or deplete said species of fish." It is apparent that there may be varying circumstances of time, place, and method of catching fish, location where they are to be found with relation to the location of the cannery, etc., which may legitimately justify the allowance of a larger leeway in one case than in another.

(9) The legislature may, without violating any rule or principle of the Constitution, confer upon an administrative board or officer a large measure of discretion, provided the exercise thereof is guided and controlled by rules prescribed therefor. (*Tarpey vs. McClure*, 190 Cal. 593, and cases cited.)

* * * * *

(13) The title to and property in, the fish within the waters of the state are vested in the State of California and held by it in trust for the people of the state (*Greer vs. Connecticut*, 161 U. S. 519, 529; *People vs. Truckee Lumber Co.*, 116 Cal. 397; *In re Phoebovius*, 177 Cal. 238; *People vs. Stafford Packing Co.*, *supra*). The legislature may dispose thereof as to it may seem best, subject only to constitutional limitations against discrimination.

(14) Within those limitations the legislature, for the purpose of conserving and protecting fish, may pass such laws as to it seem wise, and the question what measures are best adapted to that end are for its determination. (*Ex parte Kenneke*, 136 Cal. 527; *In re Phoebovius*, *supra*.)

(15) Such fish can become the subject of private ownership only in such qualified way, to such limited extent, and subject to such conditions and limitations as the state through its legislature may see fit to provide and impose (*In re Phoebovius*, *supra*; *Paladini vs. Superior Court*, 178 Cal. 369). "It is, therefore, evident that what the people of the state own they can alienate on such terms as they choose to impose, and that this power of regulation continues so long as such fish or game are the subject of trade or transfer." (*Paladini vs. Superior Court*, *supra*.) In section 4 of the act of 1917, *supra* (Stats. 1917, p. 1674), the legislature imposed the following limitations: "No such fish shall be caught, taken or killed in any manner or at any time except that the person so catching, taking or killing, or having the same in his possession, irrespective of the manner in which they were obtained, shall by such act or possession thereby consent that the title to such fish shall be and remain in the State of California for the purpose of regulating and controlling the use and disposition of same after such catching, taking or killing, and except that the title to such fish legally taken shall vest in the person so taking or possessing them, subject to the restrictions and provisions of law."

(16) It follows that if the fish were taken in violation of law the fisherman who caught them acquired no title thereto, and even if they were taken lawfully a sale thereof to defendant for use in its reduction plant would convey no title thereto, and the title would still remain in the state. The use of fish which was admittedly made by the defendant herein was not merely a violation of prohibitory provisions of a statute, but was also a wrong committed against the property right of the plaintiff. It was such an obstruction to the

free use of property as to interfere with the comfortable enjoyment thereof by the people of the State of California and as such constituted a nuisance. (*People vs. Truckee Lumber Co.*, *supra*; *People vs. Stafford Packing Co.*, *supra*.) Under these circumstances it cannot be said that such use of fish by the defendant did not or will not cause any loss or damage to the plaintiff, and this finding is, therefore, contrary to the evidence.

At the conclusion of this case every doubt as to the constitutionality and validity of each provision of the act had been solved and in favor of the Fish and Game Commission. The only troublesome feature of the statute still remaining was the necessity for the holding of hearings each year by the Commission to determine a suitable allowance for the packers. The independent reduction plant had been absolutely put out of business and the settled law in California now was that a packer was allowed a reasonable overage of sardines so as to enable him to put up a marketable pack. The Fish and Game Commission was left as the judge of what the necessary overage should be, up to a certain specified limit, namely 25 per cent of the canning capacity of each plant, and it seemed to be the consensus of opinion that a new law should be enacted which would set up in exact language the legislative will as to the exact amount of overage to be allowed the packers. Also, it was felt necessary that new teeth should be inserted in the law so that upon the filing of a complaint an immediate restraining order should issue, and if the action resulted in final injunction against the defendant, a penalty of abatement for a given period could be prescribed.

At the legislative session of 1925 a new law was passed. The Fish and Game Commission did not sponsor any of the provisions of the bill other than the penalty clauses. The other provisions granting certain definite amounts of overage were the result of a compromise in the controversy before the legislative committees in which the Fish and Game Commission remained neutral. The bill as finally adopted, except for the penalty clauses, did not meet with the approval of the Fish and Game Commission, and the cannerymen were told at the time of the passage of the bill that the Commission refused to take any responsibility for its constitutionality.

Immediately there was a difference of opinion between the Commission and certain of the packers as to the legal effect of certain provisions of the bill. On June 29, 1925, as attorney for the Commercial Fisheries Department of the Commission, I handed to Mr. N. B. Seofield, in charge of that department, my opinion on the interpretation of the statute. This opinion was submitted to the Commission and duly adopted by them as the basis on which they would continue to allow overage for the coming packing season. Inasmuch as this opinion analyzes the pertinent sections of the law, it is here set out in full.

You have asked me for an opinion as to the legal effect of the first four paragraphs of section 5 of chapter 340, Statutes 1925, commonly known as the Fish Reduction Act.

These paragraphs read as follows:

"SEC. 5. No person, firm or corporation shall suffer or cause any preventable deterioration or waste of any fish caught or taken in the waters of this state, or brought into this state, and no person shall use any fish except fish offal in a reduction plant, except of the species, in the manner and to the amount allowed by the provisions of this act.

(a) It shall be lawful for a packer of sardines, actually engaged in packing sardines, to take and use in a reduction plant in each calendar month, sardines

to the amount of twenty-five per cent of the monthly capacity of the packing plant; such capacity shall be determined by the fish and game commission after a hearing is held as in this act provided. In determining such capacity, the fish and game commission must take into consideration and base its findings upon the following facts, namely:

The number of can-closing machines for one pound oval cans of sardines actually installed in said plant and ready for and intended to be used therein during the season immediately following the making of the application herein-after mentioned; *provided*, that the other equipment of said plant necessary for canning to the capacity of said closing machines is likewise installed for operation. For each closing machine so installed the fish and game commission shall make a monthly allowance of sardines to be used in the reduction plant of 150 tons for each calendar month.

Prior to each seasonal run of sardines, packers shall make written applications to the fish and game commission to hold a hearing and determine such capacity."

The act of which these sections is amendatory provided that the Fish and Game Commission should annually make a determination as to the amount of sardines necessary to be used by each canning plant in excess of its actual canning requirements and that thereupon the Commission should fix such necessary overage, which should not, in any event, exceed 25 per cent of the amount which the canning company could can or pack. This law, as it then existed, was construed by the Supreme Court of this state in the case of the *People vs. Monterey Fish Products Co.*, which is reported in volume 69 Cal. Dec., at page 261.

The defendant in that action urged that the act was unconstitutional for the reason that it excluded everyone except those who were engaged in packing fish for human consumption from the privilege of using any such fish in a reduction plant, and at the same time it expressly provided for the granting of such privileges to these favored classes. The Supreme Court, however, declared the act constitutional and the main basis upon which it overcame the presumption that the law was class legislation was that it was necessary for packing plants to be operated efficiently and economically and at the constant rate of output matching maximum capacity; that, in order to insure so far as practical that the catch for the day should approximate the capacity of the packing plant, packers should be permitted to take an amount of fish which at times might result in an excess quantity being brought in, which could only be used for reduction purposes. The Supreme Court said, "The purpose of this is to allow the packer a certain leeway or margin of safety to enable him, so far as practicable, to operate his packing plant regularly and at capacity. There is no reason for allowing to the operator of a reduction plant who is not packing fish for human consumption any margin or leeway whatsoever because he is forbidden to take any fish fit for human consumption for use in his reduction plant."

It is apparent, therefore, that there must be reason and logic to justify the use by a packer of fish in a reduction plant as against such use of fish by a straight-out reduction plant. In the former act it was left to the Fish and Game Commission, after a hearing, to determine the amount of overage necessary for a packer to operate his plant efficiently and economically, and there had to be a finding by the Commission that the taking of such overage by the packer would not tend to deplete the species of fish and also that there was no other market for such fish. Neither of these provisions are contained in the present act. The present act leaves no discretion to the Fish and Game Commission as to the amount of overage to be allowed, nor must there be a finding by the Commission that the taking of such overage will not deplete the supply of sardines. The amount is arbitrarily fixed for the packer at 150 tons per line per month, which in the act is specified to be 25 per cent of the canning capacity of the packer. If, therefore, 150 tons per month is 25 per cent of the canning capacity of the packer, it follows that the capacity of a line for canning purposes is 600 tons per month.

Any interpretation which we may make of the present law as amended must necessarily follow the dictates and be guided by the recent Supreme Court decision. In the light of that decision, where the constitutionality of the former act was attacked, it would be absurd for us to ignore the language

of the court where it says that the overage is allowed by law for a certain definite purpose, namely, in order that the plant of the packer may be efficiently and economically operated. Economical and efficient operation of a plant certainly does not mean that a packer with a given number of machines may allow them to stand idle during the month for canning purposes, and nevertheless take into a reduction plant whole fish to the amount of 150 tons per line. This does not aid him in the operation of his canning plant and he does not need that fish for the operation of his canning plant any more than an independent reduction plant would need such fish for use direct in a plant which has no canning capacity.

Furthermore, there is a provision in the law in the second paragraph of section 5 above quoted that only a packer *actually engaged in packing sardines* may use 25 per cent of his monthly capacity in a packing plant for reduction purposes. Some intent and meaning must be given to the above italicized portion of the act. If we were to give it the meaning that a packer need only run during a portion of the month and thus earn his full 150 tons per line per month for reduction purposes, the clause in question might just as well not be written in the act. To my way of thinking, the only interpretation which can be given to this clause is that a packer, in order to earn the 150 tons per month per machine for reduction purposes, must operate that machine for canning purposes to its full theoretical capacity of 600 tons per month. If he operates it to less than this capacity of 600 tons per month, his overage for reduction purposes must be decreased accordingly.

Unless this interpretation is accepted it is clear to my mind that the second and third paragraphs of section 5 of the act are unconstitutional, owing to discrimination against independent reduction plants, for the packers to all intents and purposes would be running reduction plants without reference to canning requirements. In such event, the act will still stand with these two unconstitutional paragraphs deleted. However, under the first paragraph of section 5, it is provided that "No person shall use any fish except fish offal in a reduction plant." This, then, in final analysis, would mean that no packer could take any overage whatsoever.

My interpretation of this question of constitutionality is borne out by the case of *People vs. Monterey Fish Products Co.*, where almost the same identical point was raised, and the court there said, "The general rule is that when a proviso in the nature of an exception to a general statute is invalid the general provisions of the statute are not invalidated thereby unless it clearly appears that the provisions of the exception are so intimately and inherently related to and connected with the general provisions to which it relates that the legislature would not have enacted the latter without the former."

In my opinion, the act is constitutional and not discriminatory if we interpret it to mean that the packer must operate a line to a theoretical capacity of 600 tons per month in order to obtain an overage of 150 tons per month. In other words, the packer can use for reduction purposes 20 per cent of the fish which he takes into the plant. If the line is not run to this theoretical capacity, the amount allowed for reduction is decreased accordingly, using at all times the ratio of 80 per cent of the fish for canning and 20 per cent for reduction. This amount for reduction purposes could well be deemed necessary in order to insure a good pack and effect economical and efficient management.

Under section 3 of the act, the Commission is vested with power to make and enforce regulations. Our orders which will be issued would only determine the theoretical canning capacity of the plant and allow an overage of 150 tons per line based upon that theoretical capacity. For practical purposes it will be necessary for the Commission to establish some standard by which to determine whether or not a packer is keeping within the allowance permitted by statute. To do this, it will be necessary to estimate the usual number of cases of canned goods manufactured out of a ton of sardines. A rule should be adopted by the Commission establishing such a ratio, so that the packers may use it as a practical guide in determining whether they are keeping within the amount allowed by law.

The Commission, after accepting this opinion, adopted General Order No. 1, which reads as follows:

Pursuant to the provisions of section 3 of chapter 340, Statutes 1925, the following regulations are hereby made to govern packers of sardines:

Regulation No. I.

In order to determine whether a packer is actually engaged in packing sardines, this Commission will require that for each ton of sardines received by a packer during a calendar month he shall produce fifteen (15) cases of one pound ovals (48 cans to the case) or the equivalent if other size cans are used.

Regulation No. II.

Each packer must keep a daily record of the number of cans of sardines actually packed.

Regulation No. III.

Each packer shall make a monthly report to the Fish and Game Commission showing the total amount of sardines, in pounds, received by him during the preceding month, the total number of cases canned during said month, and the total amount of fish meal, fish oil, fertilizer or other by-products manufactured during said month. Blanks for this report will be furnished by the Commission and such report must be received by the Commission not later than the fifth day of the month following. The report shall be verified by an affidavit of the packer, or an officer if the packer is a corporation, to the effect that the report is a true and correct record of the matters therein alleged.

The foregoing order is hereby approved and ordered filed as "General Order No. 1 of the Fish and Game Commission of the State of California."

The theory upon which General Order No. 1 was based was the generally accepted understanding that if a packer used for canning purposes all the fish received, he could pack 20 cases of 1-lb. oval cans of sardines. Therefore, if only required to pack 15 cases for each ton he was receiving an overage allowance of at least 25 per cent. Furthermore, the Commission can then check on the packer, for the receipts of fish are known and the pack can be ascertained. Otherwise a check is difficult for it is almost impossible to ascertain the exact quantity of bulk fish actually diverted to the reduction plant.

Certain of the packers immediately prepared to contest this General Order upon the theory that the Commission must make a general determination of the capacity of each packing plant, and give a full allowance of 150 tons per line per month, irrespective of the actual amount of fish canned. The Commission, however, proceeded to enforce the provisions of the General Order.

The first court proceeding arising thereafter was another case brought in the name of the people of the state against the Monterey Fish Products Company, which again attempted to use fresh sardines for fertilizer purposes only. The action came on for hearing in the Monterey superior court, after a temporary restraining order had been granted, and upon the trial on the merits the superior court gave its judgment, making the injunction permanent and ordering that the premises be abated and closed for a period of three months. This was the test of the new teeth in the law.

The next court action involved the violation by a packer at Monterey of General Order No. 1, in that the packer had taken and used for reduction in one calendar month more than the amount of fish allowed by the order. The testimony showed that this packer had only packed 14 cases of sardines out of each ton of fish received. The matter went to trial, and before judgment was rendered by the court a stipulation was entered into by the parties that until the final decision in certain cases then about to be commenced in the District Court of Appeal at Los Angeles, the court should make its order modifying the temporary restraining order originally entered so that during the further pendency of the case the defendant should obey General Order No. 1 of the Commission. The defendant in the meanwhile had been enjoined from using any fish at all for reduction purposes.

Certain of the packers banded together in Los Angeles County and commenced proceedings against the Fish and Game Commission in the District Court of Appeal, Second Appellate District, Division 1. Two separate series of proceedings were instituted. One set of actions involved an application for a writ of certiorari to review the order of the Commission fixing the capacity of the canning plants, and was particularly directed to General Order No. 1, which was made a part of the Commission's order determining capacity. The petitioners sought to have the order of the Commission reviewed upon the ground that the Commission acted beyond its authority in making this General Order No. 1 a proviso of the permit.

The second set of actions, started contemporaneously, were in the nature of a petition for a writ of mandamus to compel the Commission to make orders determining capacities of plants entirely upon the basis of the number of 1-lb. oval can-closing machines installed, and omitting entirely any reference to General Order No. 1 regulating the amount of fish that must be canned in order to obtain an overage.

To the petition for the writ of certiorari the Commission filed its general demurrer, and upon the argument claimed that the act of the Commission in determining the capacity of the canning plants was not judicial in its nature and therefore the writ of certiorari would not lie. The District Court of Appeal sustained this contention of the Commission and discharged the writ. (*Van Camp Sea Food Co., Inc., vs. Fish and Game Commission*, 49 Cal. App. Dec. 38, decided Dec. 23, 1925.)

In the decision, however, the court lays down very fundamental rules as to the powers of the Fish and Game Commission, and expressly holds that a commission such as the Fish and Game Commission, which is one having a state-wide jurisdiction, can not be invested with judicial functions for the reason that "except for local purposes" section 1 of article VI of the constitution confines all judicial powers to certain specified courts.

The other five applications for writ of certiorari were likewise dismissed by the appellate court for the same reason.

In the cases for a writ of mandamus the Commission based its defense upon the fact that portions of the act of 1925 were unconstitutional in that the act contained no provision giving to packers of sardines other than those packing their product in 1-lb. oval cans the right to have the packing capacity of the plant determined by the Commission, to the

end that a monthly allowance of sardines should be made to be used in a reduction plant for fertilizer or other purposes. The appellate court sustained this contention of the Commission and also dismissed this petition. Unfortunately, the appellate court in its decision did not explain exactly how much of the act in question was unconstitutional and for this reason further litigation has ensued between the packers and the Commission.

Certain packers took the view that although the special method of determining the amount of reduction allowance had been declared unconstitutional by the court, this only meant that there would no longer be an arbitrary allowance of 150 tons for each line of 1-lb. oval can-closing machinery installed, but that any packer, irrespective of the kind or size of pack, was still permitted monthly to use 25 per cent of his canning capacity for that purpose. They further claimed that the Commission no longer having judicial functions there could not be hearings by the Commission to determine the capacity of the packing plants, and that therefore the packing capacity was a fact to be determined in each instance by the court in the event that the Commission felt that the packer had used in any calendar month more than 25 per cent of capacity for reduction purposes.

Five proceedings for injunction were commenced by the Commission in the Los Angeles superior court upon the theory of the Commission that since the appellate court's decision in the Van Camp Sea Food case on the writ of mandate, no packers were thenceforth entitled to any allowance for reduction whatsoever. That if the method of determining the capacity of a plant had been declared unconstitutional there could be no reduction allowance.

The cases came on for hearing, and in a ruling upon a demurrer filed by the defendants, the court held that the decision of the appellate court could not be construed to mean that the packers were entitled to no reduction allowance. The court held that any packer was still entitled to an allowance for reduction purposes of 25 per cent of the capacity of the plant but that the Commission was without judicial power to determine such capacity.

The following written memorandum opinion was rendered by Judge Albert Lee Stephens:

The Fish and Game act was enacted primarily to conserve the wild game and fish of the state and the portion of this act to be herein considered is as follows:

"Section 5. No person, firm or corporation shall suffer or cause any preventable deterioration or waste of any fish caught or taken in the waters of this state, or brought into this state, and no person shall use any fish except fish offal in a reduction plant, except of the species, in the manner and to the amount allowed by the provisions of this act.

(a) It shall be lawful for a packer of sardines, actually engaged in packing sardines, to take and use in a reduction plant in each calendar month, sardines to the amount of 25 per cent of the monthly capacity of the packing plant; such capacity shall be determined by the Fish and Game Commission after a hearing is held, as in this act provided. In determining such capacity the Fish and Game Commission must take into consideration and base its findings upon the following facts, namely:

The number of can closing machines for one-pound oval cans of sardines actually installed in said plant and ready for and intended to be used therein during the season immediately following the making of the application herein-after mentioned; *provided*, that the other equipment of said plant necessary

for canning to the capacity of said closing machine is likewise installed and ready for operation. For each closing machine so installed the Fish and Game Commission shall make a monthly allowance of sardines to be used in the reduction plant of one hundred and fifty tons for each calendar month."

This provision makes it unlawful to use any fish in a reduction plant and then states the exception. The exception is that sardines to the "amount of 25 per cent of the monthly capacity of the packing plant" may be used in a reduction plant. The problem for solution is, just what does this last quoted phrase mean. The state contends that it means 25 per cent of the amount of sardines it actually takes in, this per cent to be figured over the calendar months. The defendant contends that it means 25 per cent of the possible turnout of the plant without regard to the amount taken in, in each calendar month.

The phrase standing alone could mean nothing but what defendant claims it means.

The phrase considered in the light of its use in the quoted part of the statute may well mean what the state claims it means and after careful consideration I would so find. Section 5 sub (a), however, as enacted by the legislature defined the method of determining "capacity" and this method is wholly consistent with defendant's contention and wholly inconsistent with the state's contention as to the true meaning of this phrase.

It is true this portion of the statute has been determined to be unconstitutional and inoperative but it still stands as an expression of the legislature made at the very time and intended to be an effective part of the statute and is so clear that I am compelled to regard it as an unequivocal expression of the legislative intent in the use of this phrase. I, therefore, adopt the defendant's contention.

The very purpose of the law, however, impels certain qualifications of the meaning of "monthly capacity of the packing plant" in order that it shall be consistent at all with the law and its purpose. Among such qualifications must be:

If any part of the plant is not in good faith held in readiness the "capacity" is reduced proportionately.

No packer can maintain a plant larger than he in good faith intends to operate under all reasonable conditions and gauge his reduction allowances upon the full capacity of his plant. The "capacity" is reduced proportionately.

No packer can make inadequate arrangements for the production of fish to the amount of his plant's operation capacity and yet base his reduction allowance upon his plant's operating capacity. The "capacity" is reduced proportionately.

The point to be decided here is raised by an objection to the following question: "Now, during the month of January, 1926, are you familiar with the equipment and machinery and appliances in the plant of the Italian Food Products Company that were used and usable for the purpose of canning sardines?"

Defendant offered to proceed and prove the full capacity of the plant.

The objection will stand overruled and if the cause continues the proffered proof will be received.

The ultimate question as to whether or not defendant has violated the act will in addition to the proffered proof depend upon the proof (the burden of producing such proof is not here considered) of the "qualifications" to the meaning of plant capacity as herein referred to.

This still left the law in a most unsatisfactory condition and the cases are still pending.

In the meanwhile a question arose as to the right of reduction plants to take and use sardines for the purpose of making edible oil products. In the 1925 amendments to the act, special provisions were inserted to allow the use by a reduction or extraction process of sardines for the purpose of manufacturing edible products. Hearings were to be held by the Commission, and if it were established to the satisfaction of the Commission that the product proposed to be manufactured was in fact

edible, was intended to be used for human consumption and would in fact be used for human consumption, and if 50 per cent of the wet weight of the fish, or all of the oil extracted, were used in such process then the Commission could give a permit for the use of sardines for such purposes. During the year 1925 several such permits were issued by the Commission after proper hearings held thereon.

When the appellate court held that the Commission no longer had judicial power, an opinion was given to the Commission by its attorney to the effect that the Commission no longer had the right to hold hearings to determine the facts necessary on which to base a permit for the use of fish by a reduction or extraction process for the purpose of making edible products. Testimony would have to be taken at such hearings and the Commission would have to render a judicial opinion.

In September, 1926, the Bayside Fish Flour Company, in Monterey, proceeded to test out this ruling by the Commission and took fish into its plant to manufacture into an edible product. The Commission immediately commenced injunction proceedings in the superior court of Monterey County and raised the point that the granting of such a permit would be a judicial act by the Commission, and that therefore the permit heretofore granted to this defendant during the previous year and under which it was still acting was null and beyond the jurisdiction of the Commission and that therefore the defendant had no right to operate during the current year.

All technicalities were waived in the proceedings and it came on for a speedy trial before Judge Treat at Salinas. Judge Treat rendered his decision in favor of the defendant ruling, in effect, that the Commission still had judicial functions.

We thus see that we have two conflicting decisions in the superior court on this very same question. In the Los Angeles court it has been held that the Commission has no judicial functions; in the Monterey court it is held that the Commission has judicial functions.

This question is now about to be decided finally by the Supreme Court. The Globe Cotton Oil Mills of Los Angeles are seeking by a writ of mandate in the Supreme Court to compel the Commission to hold a hearing upon its application for a permit to use sardines by a reduction process for the manufacture of an edible fish oil.

The law was still due for a severe test. It having been absolutely decided that no reduction plant can any longer take fish direct from the sea and manufacture an inedible product, such as fish meal or fertilizer, a very lucrative business had been cut off. In October of this year a new method of evading the law was attempted. An old concrete vessel *Peralta*, built during war times but now without motive power, was equipped with reduction apparatus and towed to a location in Monterey Bay, slightly more than three miles from shore but inside the headlands. The claim was made that this vessel was not subject to the jurisdiction of the state because it was upon the high seas and beyond the three-mile limit. Two purse seine boats from Los Angeles were engaged to fish for the barge and operations commenced. The Fish and Game Commission immediately arrested the captains of the purse seiners and charged them with violating the provisions of the Fish Exchange Act which forbids the diversion of food fish to purposes other than human consumption without the written consent of the

state market director. The purse seines of both fishing boats were seized and injunction proceedings commenced against the Ocean Industries, Inc., the owner of the *Peralta*. A temporary restraining order was granted by the superior court of Santa Cruz County.

The defendant immediately filed a petition for an injunction in the Southern Division of the United States District Court, Northern District of California, Third Division, at San Francisco, claiming that it was a foreign corporation and that the Commission and its officers were acting beyond their authority, in that the vessel *Peralta* was located upon the high seas and beyond the jurisdiction of the state. They claimed \$9,000 damages accrued by virtue of the seizure of the nets and other actions of the Commission, and for further damages of \$1,000 per day. The matter came on almost immediately for hearing upon the application for temporary injunction, and this was denied by



FIG. 1. The steamer *Peralta*, a floating reduction plant anchored in Monterey Bay. Two purse seine boats furnished large quantities of food fish to this plant until a restraining order, granted by the superior court, put a stop to operations. Photograph by B. D. M. Greene.

Federal Judge A. F. St. Sure, who handed down from the bench his oral opinion that all of Monterey Bay was within the state of California. The Fish and Game Commission presented a motion to dismiss the bill of complaint and this was granted on November 13, 1926, and an exhaustive written opinion rendered by the court as to the legal status of Monterey Bay. This is practically the first time in the United States, or in any other jurisdiction, where any court of competent jurisdiction has come out flat-footed upon the question of territorial jurisdiction over a bay the distance between headlands of which exceeds six miles. Monterey Bay is 21 miles between promontories. Judge St. Sure's decision follows:

Plaintiff, a corporation organized and existing under the laws of the State of Nevada, files a bill in equity seeking an injunction and damages against

certain members and officers of the Board of Fish and Game Commissioners of the State of California.

Plaintiff is the owner of the *Peralta*, a vessel of more than 6000 tons burden, equipped with machinery and operated as a reduction plant in Monterey Bay, California. Plaintiff chartered two fishing boats, employed fishermen to catch fish and deliver them to the *Peralta*, where they were made into fish oil and fish meal. No sooner had the reduction plant commenced operating than the Fish and Game Commission of the State of California took action to stop what it contends is an unlawful destruction and diversion of food fish. Arrests of fishermen were made for violation of state fish and game laws, and an injunction was sought and obtained in a state court against plaintiff herein restraining it from operating its reduction plant in the waters of Monterey Bay.

The question presented to this court for decision, upon motion to dismiss, is whether or not plaintiff is operating its reduction plant within the jurisdiction of the State of California. The bill alleges that the exact position of the *Peralta* is latitude 36 degrees 53 minutes north, longitude 121 degrees 56 minutes west, which, it is admitted, is well within the indentation of the bay and the waters bounded by the shoreline of Monterey Bay and a straight line drawn between headlands Pt. Pinos and Pt. Santa Cruz. The fish, it is also admitted, are caught within these waters.

It is conceded that fish in the high seas are the property of whoever first can take them; that the territorial jurisdiction of the State of California extends only three miles into the waters of the Pacific Ocean from low water mark, and that the people of the state have a qualified property right in the fish while in those waters; that beyond the three-mile limit the State of California has no right in or to the fish, nor has it any right to interfere with any fishing operations upon the high seas beyond that line; that the federal government has never assumed to regulate and control the handling of fish for the prevention of waste, nor to regulate or control the use of fish or fishery products for reduction purposes in Monterey Bay, while the State of California, by suitable legislation, has assumed and is asserting such jurisdiction.

Monterey Bay is about 19 miles across headlands, and its indentation is about nine miles. Plaintiff contends that because of the great breadth at the mouth of the bay and its shallowness, it is in fact open sea, and has been designated a bay merely for convenience.

Plaintiff argues that if the bay exceeds six miles in width in a straight line measured from headland to headland, it is not territorial water but open sea. Monterey Bay, as we have seen, is 19 miles across from headland to headland. There is authority supporting the proposition that to constitute a bay under the law there is no limit to distance between headlands fixed at an arbitrary limit of six miles. A statute of Maryland was enacted for the purpose of preventing the destruction of oysters in the waters of that state, and a vessel was seized while dredging for oysters in Chesapeake Bay. The bay is 12 miles across at the ocean. The statute was upheld. (*Smith vs. Maryland*, 18 How. 71.) Conception Bay, more than 20 miles wide between promontories, was held to be part of the territory of Newfoundland. (*The Direct U. S. Cable Co. vs. Anglo American Tel. Co.*, L. R. 2 App. Cas. 394.) Moray Firth, more than three miles from shore, held British territory. (*Mortensen vs. Peters*, 14 S. T. L. 227.) So, too, the United States includes in its territorial waters Chesapeake Bay, the entrance to which is 12 miles from headland to headland; Delaware Bay, which is 18 miles wide; and Cape Cod Bay, which is 32 miles wide; as well as other inlets of a similar kind. (Pitt Corbett "Leading Cases on International Law," 4th ed., p. 145.)

The boundary of the State of California is defined in the constitution of California, section 1 of article XXI, and includes "all the islands, harbors and bays along and adjacent to the coast." The quoted language declares in effect that Monterey Bay is a part of the territory of the state.

In addition to the constitutional definition of the state's boundary as including all bays, there is also section 25½ of article IV of the state constitution, which provides that "the legislature may provide for the division of the state into fish and game districts, and may enact such laws for the protection of fish and game therein as it may deem appropriate to the respective districts."

In accordance with this constitutional authorization the legislature has adopted several comprehensive acts dividing the state into districts and providing for the protection and conservation of fish and game. District number 17, defendants contend, includes all of Monterey Bay, while plaintiff points out that the language designating the boundaries of the district admits of no such generous interpretation. The boundaries of the district, as including all of the bay, may not be clearly described, but under the circumstances I feel constrained to accept the defendants' claim in that regard.

I am therefore of the opinion, based upon the facts of the instant case, it appearing that the state, by its constitution having declared Monterey Bay within its boundary; having by suitable legislative enactments assumed and exercised jurisdiction over the waters and fisheries in controversy there being no affirmative action of Congress taking such control, that this court is without jurisdiction to further proceed in the matter. It follows that the motion to dismiss must be granted and it is so ordered.

In the meantime a hearing was held in the superior court of Santa Cruz County on the order to show cause why the temporary injunction



FIG. 2. A number of confiscated nets, valued at \$6,000, secured from Steamer *Peralta*, a floating reduction plant. Photograph by B. D. M. Greene.

should not be made permanent during the continuance of the case, and on November 1, 1926, Judge H. C. Lucas of that court granted an order for an injunction *pendente lite*. Thereupon the defendant, Ocean Industries, Inc., applied to the Supreme Court for a writ of prohibition to prevent the superior court from further proceeding with the pending case. This alternative writ of prohibition was issued returnable Tuesday, November 16, 1926, and was then argued before the Supreme Court at Sacramento, sitting *en banc*. On January 11, 1927, the Supreme Court handed down its decision (73 Cal., Dec. 99) denying the writ of prohibition, and sustaining the Fish and Game Commission on every point. Not only did they hold that all of Monterey Bay and for a distance three miles beyond the headlands was within the State of California, but they also held that the barge *Peralta* was actually located within Santa Cruz County.

While this case was pending in the Supreme Court, the Ocean Indus-

tries, Inc., removed the barge *Peralta* from Monterey Bay and anchored it in the Santa Barbara channel, outside of the three mile limit, but it has never used any fish for reduction purposes at that point, owing to its inability to get any fishermen to work for it.

On December 23, 1926, the Ocean Industries, Inc., started a new suit against the Fish and Game Commission, and its employees, in the United States District Court for the Southern Division, asking for an injunction to prevent the Commission from interfering with the operations of the *Peralta* beyond the three mile limit and for damages for alleged acts of the Commission in preventing fishermen from working for it. This matter came on for hearing before the district court on an order to show cause, and the application for a temporary injunction was denied.

On February 1, 1927, the captains of the two purse seine boats, who had been arrested in Monterey Bay for diverting food fish to the *Peralta* without permission from the state market director, came into the justice's court and pleaded guilty and were each fined \$100. Immediately thereafter, on February 3d and 4th, two superior court cases came on for trial in the superior courts respectively of Monterey County and Santa Cruz County, which had been instituted by the Fish and Game Commission for the purpose of condemning the two purse seine nets seized from these fishing boats. The captains of the two boats put in an appearance in court and claimed the nets as their property, and alleged that there had been no violation of law in their use. The matter was fully argued in both courts, and at this date of publication the matters still stand undecided as both superior courts have requested briefs upon the subject.

While all this litigation with the owners of the *Peralta* was pending another boat, the *Lake Miraflores*, was commissioned by Stanley Hiller, Inc., to cruise outside the three mile limit and take sardines for reduction purposes. This boat differed from the *Peralta* in that it had motive power on board in addition to reduction apparatus. The owners of the *Lake Miraflores* hearing that the Commission might take steps to interfere with their operations outside the three mile limit, suddenly applied to the superior court of Alameda County for an injunction. The matter was fully argued in the court and submitted to a decision. Prior to the time the court gave its ruling the action was dismissed. Thereafter the *Lake Miraflores* put to sea and attempted to get fishermen to fish for it in Santa Barbara channel. No fishermen, however, seemed to be willing to take a chance and the vessel put back into San Francisco Bay. A conference was then held with the officials of the Commission and the owners of the boat suggested installing a cannery on board so as to comply with the California law. The matter was regarded as settled. However, the *Lake Miraflores* again put to sea without cannery equipment and anchored a short distance below San Pedro, in San Pedro Bay, about four and a half miles from shore, but within the bay as defined in the recent Supreme Court decision in the *Peralta* case. They there took a small amount of fish and manufactured it into fertilizer. The Commission immediately instituted an injunction suit in the superior court in Alameda County, asking for a permanent injunction against the boat and for its abatement for three months as a penalty. This action is still pending and the boat is under temporary restraining order.

EFFECT OF THE RECENT LAW PROHIBITING THE TAKING OF BARRACUDA IN CALIFORNIA WATERS WITH PURSE SEINE OR ROUND HAUL NETS.*

By J. A. CRAIG.

Since the law prohibiting the taking of barracuda with purse seines or round haul nets went into effect in July, 1925, the burden of supplying the markets with barracuda has fallen very largely upon the gill netters. At the present time approximately 85 per cent of the barracuda brought into Los Angeles County from local waters is taken with gill nets. The small, remaining percentage is chiefly taken by gig boats, with a very few caught by live bait or on set or hand lines. Therefore, any changes in the barracuda fishery, since the enforcement of the anti-

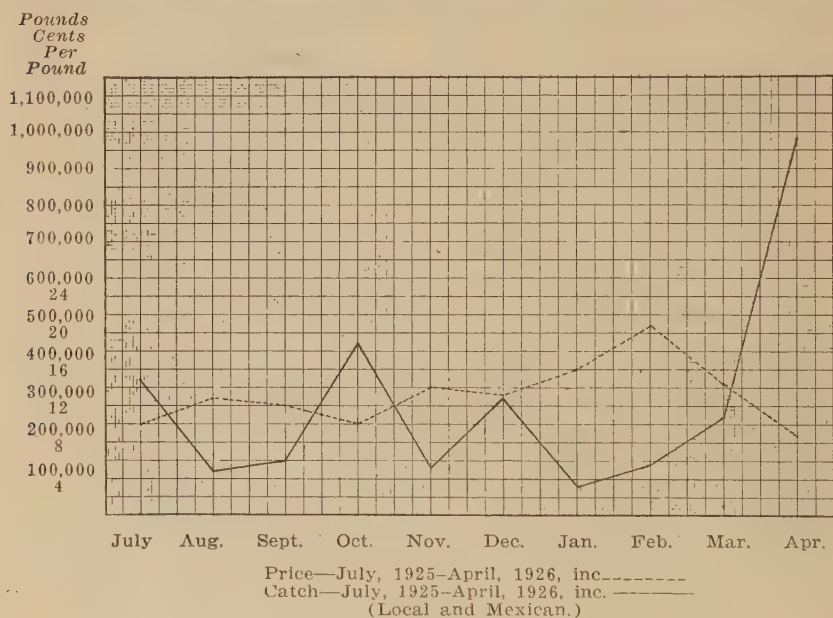


FIG. 3. Relation of catch and price of local and Mexican barracuda in Los Angeles County.

purse seine, round haul net law, can be attributed to the monopolizing of the fishery by the gill net method.

The most notable result of this change in methods is the falling off of the total catch. The catch for the ten-month period, July, 1925, to April, 1926, inclusive, was 1,273,289 pounds; the average catch for the same period in the five preceding years, 1920 to 1924, inclusive, was 1,899,171 pounds. This is a falling off of 33 per cent of the average catch for the periods, July to April during the years 1920 to 1924, inclusive, in the same period of 1925–1926.

As would be expected, this drop in supply brought about a rise in price. So we have an average price for the July to April periods, of the years 1920 to 1924 inclusive, of 9.81 cents per pound, and an

*Contribution No. 65 from the California State Fisheries Laboratory, June, 1926.

average price of 13.16 cents per pound for the period, July, 1925, to April, 1926, inclusive.*

The way in which the price fluctuates with the supply can be seen in figure 3, where average monthly price and monthly catch for the period, July, 1925, to April, 1926, inclusive, are both plotted. It will be noticed that in every case, except one, the price rises where the catch falls and falls where the catch rises. This exception is in the month of February when the supply and price both rose. This might have been caused by a general shortage of fish other than barracuda at that time.

One of the arguments used against the purse seiners was that they kept the market in an unstable condition by bringing in large quantities of barracuda at irregular intervals. So now the question arises, whether the gill netters and gig boats are bringing in a more constant supply of fish, now that they have the field to themselves, than they did when combined with the purse seiners and round haul fishermen.

In figure 4 the monthly catches of barracuda caught in California waters and landed in Los Angeles County for the periods from July, 1925, to April, 1926, inclusive, and monthly averages over the same periods during the years 1920 to 1924, inclusive, are plotted. It can be seen that the catch in July, 1925, was above the average catch for that month in the preceding five years, but dropped very rapidly in August and continued at a low level until April, when it again made an enormous leap to be equal to the average catch.

The average monthly catch of the five-year period, however, has no such abrupt drop in August and keeps a much higher average until January is reached, when it seems there is a shortage of locally caught fish under any conditions. The average catch for February and March is also above the 1926 monthly totals, while the month of April is equally great in both cases.

In figure 5 the average monthly prices, for periods corresponding to the catch figures used in figure 4, are plotted. As would be expected the prices for July, 1925, and April, 1926, are fairly close to the average prices of the same months in the preceding five years, but in the remainder of the 1925-1926 season when the catch dropped far below the average, the price soared above the average price for the same period of the preceding five years.

The catch for one year would be expected to vary more than the average of five years, so in order to get a better comparison of variability, the season of July, 1925, to April, 1926, inclusive, was plotted with like seasons of 1922-1923 and 1924-1925 in figure 7. It is evident from this figure that both of these latter seasons, especially that of 1924-1925, keep up their average from August to March, inclusive, far better than the season of 1925-1926 and have not such a great range of variability.

In figure 6, the average monthly prices for seasons corresponding to the catch figures used in figure 7 were plotted. The prices for the 1925-1926 period are seen to be more variable than those of the other seasons plotted and an inverse condition to the catch exists, with the prices reaching a much higher level from August to March, inclusive, than either the 1922-1923 or the 1924-1925 period.

*Complete tabulations are available from the State Fisheries Laboratory, Terminal, California.

To get a more direct comparison of monthly catch variability of the 1925-1926 period to that of the other two seasons plotted in figure 7, the mean deviation of each of the three periods was determined. This was done by summing up the monthly totals of each of the three periods separately and dividing the sums of each by the number of months, thus securing the arithmetic mean of the monthly catches of each period (season). The difference of each monthly total from the mean of its period was then found and the differences for each month in the same period were summed up. The sums of the deviations in each period were then divided by the number of months in their respective periods, in each case ten, and the mean deviation thus secured.

The mean deviation for the period 1925-1926 was found to be 140,119; for the 1924-1925 period, 149,751; and for the 1922-1923 period, 151,996. These numbers are, of course, no true criterion of the

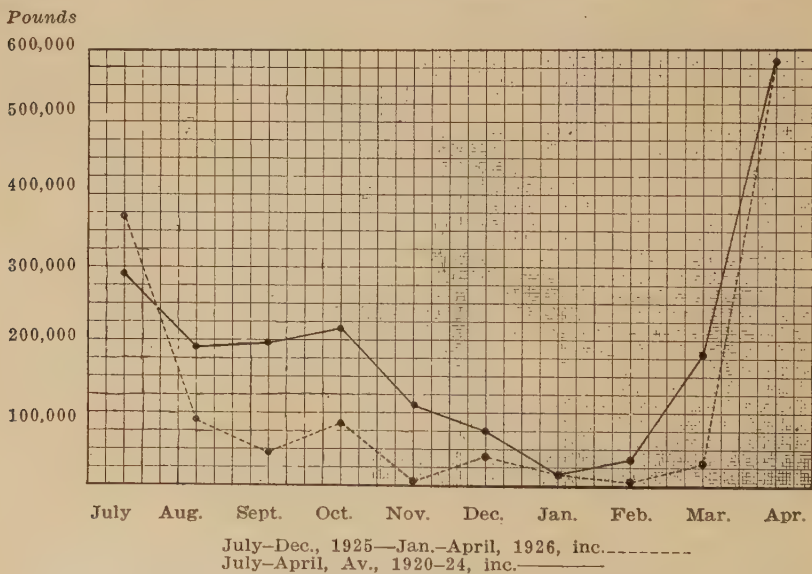


FIG. 4. Average monthly catch of barracuda in Los Angeles County.
Local fish only.

comparison since they are merely averages of deviations in series of numbers whose values also vary. The average monthly catch for the 1925-1926 period is 127,329 pounds; for the 1924-1925 period, 317,370 pounds; and for the 1922-1923 period, 198,126 pounds. It can at once be seen that to make a true comparison of variability, the magnitude of the items in each series must be taken into consideration, and the amount of variability in proportion to the average size of the monthly catches in each period determined.

To do this a coefficient of variation was worked out. This was done by merely determining what percentage of the monthly average the mean deviation of each period is, each mean deviation being divided by the corresponding monthly average and multiplied by 100. With the deviations thus reduced to percentages, we have a means of direct comparison of the variability of the three periods. After this is done

we find that the coefficient of variation for the period, July, 1925, to April, 1926, inclusive, is 110.05; for the like period of 1922 and 1923, 76.72; and for 1924 and 1925, 47.18.

The same procedure was followed with the average monthly prices of the same periods, and it was found that the coefficient of deviation for the monthly average prices of the period from July, 1925, to April, 1926, inclusive, is 19.00; for the same period in 1924 and 1925, 15.17; and in 1922 to 1923, 17.22.

Therefore, we may safely say that since the enforcement of the law prohibiting the taking of barracuda with purse seine or round haul nets, the monthly variation in catch and consequently in price is greater than it was before the law was passed and became active.

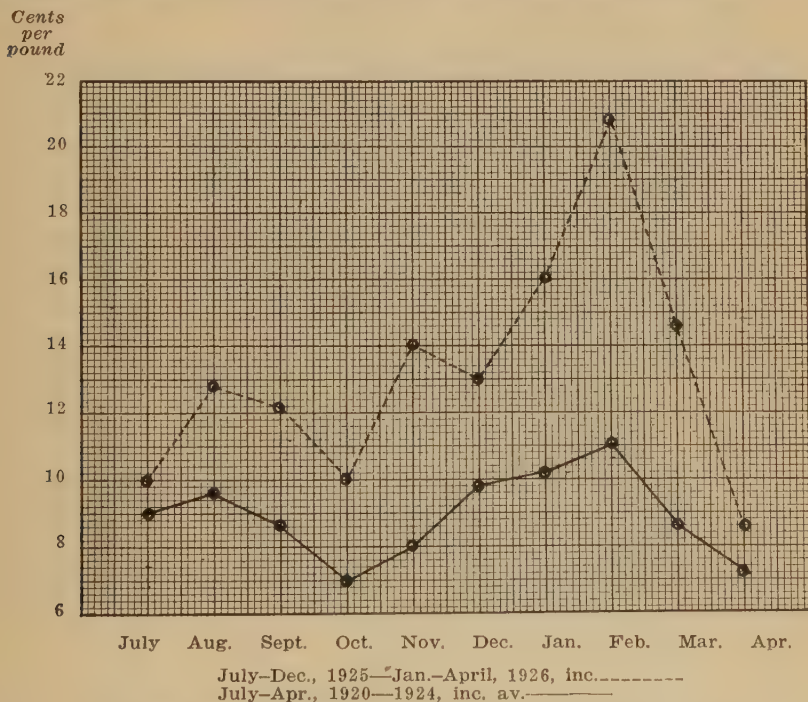


FIG. 5. Average monthly prices of barracuda in Los Angeles County.

We can safely assume that the period of large catches for the gill netters will continue through April, May, June and July, since the same fishing conditions and temperature prevail roughly through this season. Also this period contains the spawning season for the barracuda. So during a complete year under our present law we can expect a period of large catches and moderate prices during April, May, June and July, and a period of small, irregular catches and extremely high prices through the rest of the year.

The reason for the gill netters making large catches in the late spring and early summer appears to be that at that time the barracuda are plentiful close inshore and around the kelp. This may be an inshore spawning migration as this period marks roughly their spawning

season, or it may be a migration to shallower water for feeding purposes, or an influx of fish from the south as the water grows warmer. At any rate, the gill netters do not seem able to keep the market consistently and fully supplied with barracuda during three-quarters of the year.

Both the dealers and fishermen claim that even in the best season for the gill netters their catch is very variable from day to day, as it is greatly affected by the phases of the moon. What little work we had time to do on this portion of the subject seemed to confirm this and indicate that there might possibly be a lunar periodicity in the gill net catches. If so, this might be due to the spawning habits of the fish, a depth, or an inshore migration as they follow the bait fish, chiefly anchovies and sardines, which in turn may migrate following plankton,

*Cents
per
pound*

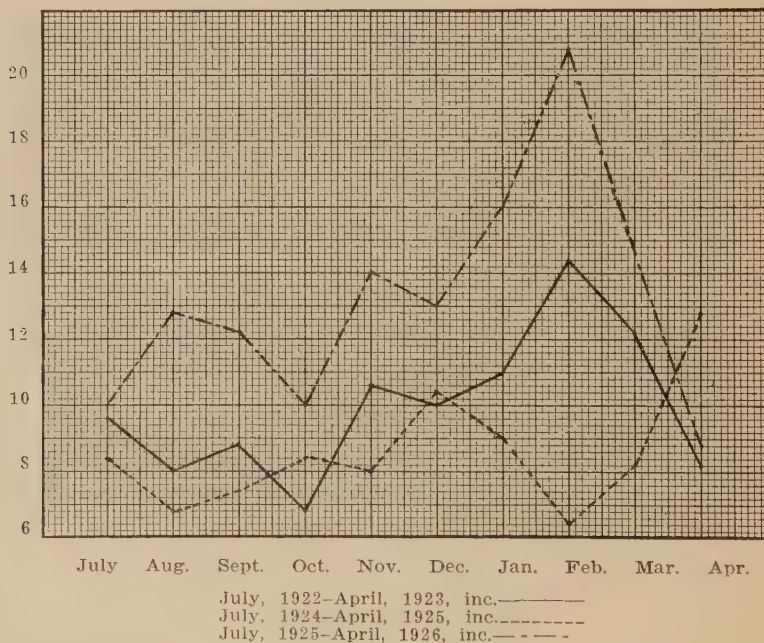


FIG. 6. Comparison of prices of barracuda.

partially controlled by moon phases, or the fish may be able to see and avoid the gill nets in the lighter phases of the moon. We have not had opportunity to do much more than speculate on this part of the problem, but some very interesting and profitable work could be done on it.

The decreased and unstable barracuda catch seems to be having a far reaching effect on species of fish other than the barracuda. The dealers say that since the price of barracuda has gone up to such a high point and the supply is so uncertain, there is a greater quantity of salmon shipped in here from the north and sold than was formerly the case. The barracuda used to be their stable fish, one on which they could guarantee delivery, but now the salmon of the north can successfully compete with the barracuda here in price and certainty of delivery.

Improved cold storage facilities at San Pedro would help them greatly to meet that competition, but it does seem strange to have frozen fish shipped four or five hundred miles to a place where fish are as abundant as they are in the waters adjacent to San Pedro.

Also a greater demand for yellowtail, white sea bass and halibut is created by a shortage of barracuda, as these fish are sold to the same class of trade as the barracuda. Besides the added incentive to catch the above mentioned fish, an additional drain is put on the yellowtail and white sea bass, because when the purse seiners are not allowed to catch barracuda the only fish left for them, when the blue-fin tuna are not plentiful, are the yellowtail and white sea bass. Therefore we can expect the purse seiners to devote more of their energies to catching these fish.

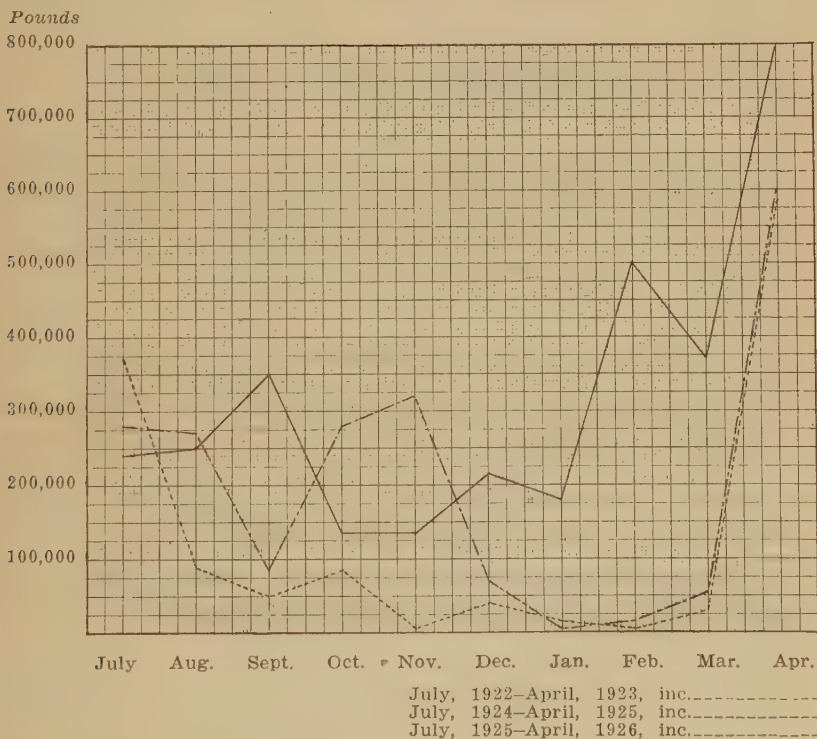


FIG. 7. Catch of barracuda in Los Angeles County. Local fish only.

The added numbers of gill nets and gig boats in local waters also make another hazard for the yellowtail and white sea bass, as yellowtail are often caught when gigging for barracuda, and small fish of both varieties are often brought in by gill netters setting for barracuda. From what superficial knowledge we have on the subject, it does not appear that the white sea bass fishery, especially, is able to stand any added strain, even as well as the barracuda could.

There is small doubt but that purse seining is a wasteful method of taking barracuda, because of the undersized fish gilling in the seine, or being hauled up on deck along with larger fish or being injured when

the net is merely being pursed. However, gill netting as well as purse seining, may destroy quantities of fish that can never be used for human consumption because of the large losses of gilled fish eaten by sharks and sea lions. The gill netters themselves say that they frequently lose from 50 to 75 per cent of the fish gilled, by sea lions eating the fish from the nets. They haul in their nets only twice a night usually, and sometimes find nearly the whole catch destroyed. Of course, this is more an argument against the sea lions than it is against the gill netters.

In order to suggest any certainly intelligent legislation in a fishery, one should have a good idea of the life history of the species in question and know to what extent depletion of the species has taken place. In the case of the barracuda we lack this information, but when as much as we know concerning the species and the economic conditions of the fishery and an entire year's catch is considered by monthly totals, a possible solution of the problem suggests itself. There is a period of four months, April, May, June and July, when the gill netters and gig boats are able to adequately supply the market. During the balance of the year the catches are small and irregular, causing high prices and a shortage of barracuda in the market.

If the purse seiners were allowed to fish for barracuda throughout the year except during the months of April, May, June and July, the monthly catches would be more nearly equalized and be more stable, and there would not be such a shortage of fish during the greater part of the year when the gill netters are unable to take fish consistently or in good numbers.

This arrangement would do away with the rather wasteful purse seine method of taking the fish when the more economical methods will suffice, and allow the purse seiners to supply the market with barracuda when the small boat fishermen are unable to do so. Also, it would keep the price up enough through the entire year so that the small boat men can make a living, as it was only during the four-month period of abundance that the purse seiners so flooded the market that it did not pay the small boats to bring in their fish. The barracuda would be afforded some protection then when they are abundant and close in shore and when they are spawning, as their spawning season falls in the four-month period of April, May, June and July.

No great hardship would be worked on the purse seiners as the blue-fin tuna usually arrive in our waters some time in May and that fishing continues throughout the summer. With the suggested four months' closed season for purse seiners on barracuda, the purse seiners would be able to have a paying business and catch fish when the other people are not able to do so, and also the small boat men would not be put out of business by a flooding of the market in the season of great abundance of fish. The barracuda would receive some protection during their spawning season, a wasteful method of fishing would be eliminated when it is not needed, and the purse seiners upon whom we depend to bring a large part of our winter supply of fish from Mexico when our local fisheries are at their zero point, would not be in danger of having to cease operation.

SUMMARY.

Since the enforcement of the law prohibiting the taking of barracuda in purse seines, the bulk of the fish are caught in gill nets. The total catch has diminished and the price has risen. The monthly catch and consequently the average monthly price are more variable.

The shortage of barracuda and increased fishing by purse seiners will probably put a heavier strain on the white sea bass, yellow tail and halibut fisheries, which they can not well stand.

The period when an adequate supply of barracuda can be brought in without the aid of purse seines is only four months—April, May, June and July.

A possible solution of the problem is to allow the purse seiners to fish for barracuda all year except April, May, June and July.

STRIPED BASS AS I KNOW THEM.

By C. E. HUBBACK.

I find the striped bass a very contradictory fish, bold and shy by turns. When feeding, nothing seems to alarm them. They will often pass close to a person, or swim around a boat without any apparent fear. At other times, the mere shadow or sound of a plug as it flies through the air will be sufficient to scatter an entire school.

Bass often travel in schools when not feeding. I have seen them stringing along the bottom, heads all one way, or lying in the shallow water on the weedy edges in the moss, apparently resting. At such a time, I have never had any luck fishing with fresh bait, nor could I excite them to action by plug casting. Again, I have found a school of bass splashing about as in play, and when so employed they refused bait. If I persisted in fishing they all disappeared.

Several curious experiences have convinced me that bass are able to cast a phosphorescent glow when feeding at night. I was camping by a brackish lagoon one very dark night when I heard a bass rush something in the weeds not ten feet from where I was sitting. Naturally, I watched the place from which the noise came, and was amazed to see a glow on the water, sufficient to enable me to see the outline of weeds and grass clearly, and even the bubbles on the water three or four inches from the light. After the glow I heard the fish rush and make that popping or sucking sound. The entire performance was repeated six times. Another time, about the same thing happened to me on the Salinas River. I should be glad to hear from others on this subject as I was afraid of being doubted, so hesitated to tell of my experience.

Like all other fish fans I have my favorite hook-up. I like a number 6 twelve-pound test line, dyed a light brown for about fifty feet, with a small hook, about a number 0000, cut so short as to be entirely hidden by the bait. I like about a foot and a half of line for a snell, wrapped on the hook with silk, and secured with shoemaker's wax. If there is little or no current, I omit the sinker. Where it is necessary to use one, I prefer a light sliding sinker. I make a very satisfactory slide by cutting copper tubing three-eighths of an inch long and flaring out each

end with a center punch. Tie the sinker line around this piece of tubing with the sinker about eighteen inches away from the slide, or the same length as the hook snell. Slip the end of your line through the piece of tubing. Cut some leather washers about half an inch in diameter and punch a small hole in the center of each. Next run your line through these washers, then fasten on a swivel. To the other end of the swivel fasten on your hook snell. You now have a sliding sinker rig such as I use.

You will note that should a bass pick up your bait, the weight of the sinker will not be felt. With plenty of slack line, and the snell hook in the bait, your fish can move away unsuspecting of either sinker or hook. This, I find, gives him time to swallow the bait. The result is that most of the fish I catch with bait are hooked far back in the mouth.

One hook on a line is all I use—a double is seldom hooked and hardly ever landed. Why take the chance of losing your tackle or having a nice fish break away with a hook deep in his mouth to die a slow death.

Monterey sardines seem to be the best bait in our waters. Cut them up in pieces three-quarters of an inch long, just large enough to cover the hook well. Bass will swallow a small piece of bait at once, whereas a large piece has to be crushed so that the hook is often detected. Bullheads and other small fish are often good, either alive or dead. I have taken bass on sand-crabs, sand-fleas and sand-worms. I once took a twelve-pound striped on a piece of a blackbird.

The early morning (until about 9 o'clock) and the late afternoon and evening are the times I find the best to fish lagoons and rivers where there is little current. When fishing still water it always pays to keep out of sight and as quiet as possible. Try it once. Give the bass plenty of time to swallow the bait, then set the hook, not with an awful heave, but rather with a precise snap when the line is drawn taut by the fish. Don't horse your fish—let him run when he wants to. Just keep a little strain on the line. The time to take back line is when the fish eases up. Look out for a last rush when the fish sees you, or your boat. He will always make one more rush to escape, and if you are not on the alert, he will get away. Many fish are lost on this last rush. I do not gaff a fish unless it is necessary to lift it into my boat. When gaffing a fish, lift it on the point of the gaff hook. Do not strike down on it. You are likely to knock the fish off, particularly if it is lightly hooked.

Please do not become inhumane and club the poor fish to death like a holdup man. There is a better way to dispatch the fish, which leaves it in better condition. Lift the gill cover and with a sharp knife cut the skin between the gills and the body. Hold the fish up by the tail for a minute or two to let it bleed freely. Be sure to dress the fish as soon as possible, after catching. Roll it up in a wet sack and keep it in the shade or bury it in the sand to keep it cool. You will find that fish scale much easier if they are kept moist.

So much for bait fishing, now for the lures. There is no doubt that more bass have been taken on the red-head Basoreno than any other lure. Other plugs prove successful at times. A surprise minnow is a good one to run tandem with a red-head. Hook them up three feet apart, the surprise minnow in front. A plug with green on it is often

good in daylight. I have taken bass on an Al. Foss, Little Egypt pork rind spinner, substituting a strip of red cotton for the pork rind. The Shannon twin spinner will attract them sometimes. I have made several good catches with a phantom minnow. When casting a lure for bass in still water, never cast into or over a school of bass if you see them. Drop your lure near them so as to excite them without giving them a chance to see what it is that fell into the water. Do not always blame the line, or the dealer who sold it to you should you lose a fish by the line parting near the hook, when you know you have not been rough with the fish. Carefully observe the next bass you catch. About the center of the gill cover you will see a very sharp bony edge hidden there that can cut any line that comes in contact with it. Fish are frequently lost in this way. Test your hook snells often when fishing, and always after fighting a fish. In doing this you will save quite a few hooks and fish. Never fish in a hurry. I find that patience and perseverance are very necessary to become a good bass fisherman.

BELIEVE IT OR NOT

By AUGUST BADE.

The question is often asked, "Does the male quail share the nest with the hen during the incubation period?"

A few years ago a farmer called one day at the Game Farm in Washington to let me know that he had a brood of Hungarian partridges hatched from some eggs that he had picked up during the alfalfa cutting. He wished me to come and get them as he had no way of taking care of them. In covering the valley for setting hens many friends had been made among the farmers and they had been advised that when nests of any of the game birds were found during farm operations such as cutting hay and plowing, they would be doing a good turn if they put the eggs under a hen for safe keeping until someone from the Game Farm had time to come and get them. This was one of the many examples of that friendly cooperation that resulted in the saving of many nests of eggs.

While I was there getting the little freckle-faced Hungarians only a day old, the farmer's young son of about six years whispered to me, "I knows where is a quail's nest." There were quite a number of bob-white quail in that particular section of the valley and as the farm was in need of breeding stock of this variety, it looked like a very good time to get a clutch of eggs. After some little search among some small willows, sure enough there was the nest and the hen was on the eggs at the time. We were so very near the nest that I felt sure she was setting because at any other time a bird will not permit you to come so close to the nest without flying away. Several ideas passed through my head in quick succession, among them: Could a nest be moved and the bird still claim it? I had never tried the experiment. This was the opportune time. We quietly backed away from the nest and went to the house, only a few rods away, to see what the farmer had that would aid us in taking the mother quail as well as the nest and its precious eggs. An old galvanized washtub was the best looking net I could see. I took the tub and walked within a few feet of the

nest and quietly tossed the tub over bird, high grass and all. The scheme worked, for the bird did not fly away. The tub was pressed down quietly to be sure of no accident, and I ran my arm under the edge of the tub and after some little skirmishing with one hand the bird was firmly secured. The tension of the last few seconds was immediately released as I drew the bird out to discover to my surprise that we had caught the father bird instead of the mother. Possibly this was only one of those exceptions that mathematicians say prove the rule.

A few months later we were shipping the breeding stock of that season, as was the custom at that farm. No birds were held more than one season for breeding purposes. There were eighteen pens of bob-white breeding stock to be liberated. The boys were instructed to catch and crate them for their ride of 200 miles where they were to have a new home and plenty of elbow room. These birds were all mated in pairs with just one pair to the pen. There should have been thirty-six birds, but a careful count revealed only thirty-five. Where was the other bird? It must have been overlooked in the pen. One of the boys explained that in one of the pens he found but one bird. Possibly the other one had died or had been caught by one of the many rats that at times gave much trouble among the small birds. The incident was closed for the time and the rest of the birds sent on their way rejoicing. But the incident did not stay closed, as in about ten days these pens were being cleaned up and the cover which had been their protection during the breeding season was raked out and burned. To make a long story short, in one pen was found the father bird and six little bob-whites apparently well and doing nicely. Two other pens were opened, giving them more room, and the young birds came to maturity with but a single parent—and that the father. At the time we were catching the quail for shipment it happened to be his turn on shift and as it was nearing the time of hatching he was simply running true to form in standing by the eggs, or rather sitting on them, while his little mate was being netted and removed from the pen. This instinct of many birds to cling closer to the eggs as the hatching day draws near is very marked. The trait is more noticeable in love birds, or that class of birds that multiply by mating in pairs only.

To further illustrate this point let me cite an incident of the Hungarian partridge. At the time, I was interested in finding a few of these eggs in order to do some experimenting with them to determine if they would respond to the same living conditions under which the Chinese pheasant had been raised. A farmer had run onto a nest and called me as he had been asked to do. In company with the man I went to the spot indicated by him, along an old fence row. There was the bird on the nest. I had no desire to get the bird but only the eggs, so walked rather boldly up to her, expecting she would leave the nest at any moment, as these birds are by nature very hard to approach in their natural haunts. She stayed by the nest until I quietly shoved her off with my hand. Her clutch of twenty-two eggs hatched four days later under a bantam hen after being moved a distance of twenty-five miles.

INTERESTING BOOKS ON FISH, FISHERIES AND RELATED SUBJECTS.*

This list is intended to help local and school librarians to select books for their collections, and to suggest interesting and profitable reading on the history of fisheries, conservation, and marine biology. All the books are perfectly comprehensible to the general reader, and suitable for reference use by students as well. Unless otherwise specified, the quoted annotations given are taken from the author's preface or from the publishers' announcements. Others are supplied by the compiler.

All books except those marked with an asterisk are in the possession of the California State Fisheries Laboratory at Terminal Island, California, and may be consulted there by anyone seriously interested.

ON SHORE LANDS AND THEIR FAUNA.

1. Arnold, Augusta F. *The sea-beach at ebb tide.* N. Y., Century, 1916. 490 p., more than 600 illus., 8vo. No bibliog. \$4.50.

This book will help the amateur or student to identify marine algae and invertebrates found on the beach. Although only Atlantic coast species are figured and described, many of the same genera are found on the west coast. "Technical phraseology has been avoided as much as possible, even at the expense of conciseness and precision."

2. Carey, Alfred E., and F. W. Oliver. *Tidal lands: a study of shore problems.* London, Blackie, 1918. 298 p., illus., Cr. 8vo. No bibliog. \$3.00.

"This work is primarily concerned with those problems which underlie the maintenance of coastal and riparian lands, and, as a factor in such control, the extent to which horticulture may be enlisted in the cause of conservation."

3. Flattely, Fred W., and C. L. Walton. *The biology of the seashore.* N. Y., Mac-Millan, 1927. 336 p., illus., 8vo. Bibliog. pp. 315-323. 16s net.

"The main idea underlying the present work is to treat the plants and animals inhabiting the seashore from the ecological standpoint: to show, that is, how they interact, and, in particular, to demonstrate the influence of the environment upon their structure, functions, habits, and general reactions." Chiefly British species are treated, but some foreign forms are included. On pages 250-251 reference is made to the California grunion, a fish with tide-controlled spawning habits, the life-history of which has been worked out in Fish Bulletins Nos. 3 and 10 of the California Fish and Game Commission.

"While no attempt has been made to shun technicalities, care has been exercised that they should not be multiplied unnecessarily."

4. Johnson, Douglas W. *Shore processes and shoreline development.* N. Y., Wiley, 1919. 584 p., 149 figs., 73 full page plates, 8vo. Bibliog. pp. 533-551. Lists of references at chapter ends. \$6.00 net.

"A valuable text and reference for teachers and students of geology and geography, and for engineers engaged in marine work. A thorough

*Contribution No. 64 from the California State Fisheries Laboratory, compiled by Ruth Miller Thompson, Librarian, California State Fisheries Laboratory.

discussion of the dynamic forces operating along the coast is given, as well as an elaborate analysis of the marine cycle and a description of shore forms."

5. *Johnson, Myrtle E., and Harry J. Snook. Seashore animals of Pacific coast. N. Y., MacMillan, 1927. Illus., 8vo. \$7.50.

Forthcoming. This ought to be the best popular guide to shore invertebrates of the west coast available. At present reference to many scattered scientific publications is necessary before identifications can be made.

6. Marmer, H. A. The tide. N. Y., Appleton, 1926. 282 p., illus., Svo. No bibliog. \$2.50.

"The first comprehensive and authoritative work on the tide written for the general reader. * * * It presents in a thoroughly readable style and without the use of mathematics, the latest knowledge concerning tides. * * * A book of fascinating content, handled with much descriptive skill."

ON SHELLFISH, ETC.

1. Keep, Josiah. West coast shells. Also a chapter on the fresh water mollusks of the Pacific slope by Harold Hannibal. Rev. ed. San Francisco, Whitaker and Ray-Wiggin, 1911. 346 p., illus., 8vo. No bibliog. \$2.50.

The earlier edition (1904) contains a list of references to literature, arranged by species, which is lacking in the second. The 1911 edition, however, contains a biographical index, a glossary and a checklist of species.

This is a popular handbook, not an exhaustive scientific compilation.

2. Kellogg, James L. Shellfish industries. (American Nature Series, Group IV---Working with nature) N. Y., Holt, 1910. 361 p., illus., 8vo. No bibliog. \$1.75.

An account of the food mollusks of the United States, chiefly written "for those who eat them, for those who may be or desire to become directly interested in their culture, and for those who may have an interest in the biological problems involved in their artificial control." Particular emphasis on oysters, clams, and scallops. A chapter on "ciliary mechanisms" presents the results of original research by the author.

3. Oldroyd, Ida S. The marine shells of the west coast of North America. Vol. I. Stanford University Publications, University Series, Geological Sciences, Vol. I, No. 1. Stanford University Press, 1924. 247 p., 57 pls., 8vo. Bibliog. pp. 233-235. \$4.

"The purpose of this work is to bring together the marine shells of the west coast of North America from the Arctic Ocean to San Diego, giving the original description, whereabouts of the type and type locality, geographical and geological range. * * * All the common California species are figured, many of them for the first time. * * * It is the purpose of the writer to make this work useful to the amateur as well as to the professional conchologist." The classes Pelecypoda (bivalves) and Brachiopoda, only, are treated in this volume. Volumes dealing with the other classes are expected.

4. Shipley, Arthur E. Pearls and parasites. London, Murray, 1908. xv, 232 p., 10 illus., 8vo. Bibliog. pp. xiii-xv. 7s 6d net.

A collection of short popular essays and lectures on various biological subjects. Those of interest for this list are on "Pearls and parasites," "The depths of the sea," and "British sea-fisheries."

ON THE NATURAL HISTORY AND BIOLOGY OF FISHES.

1. Jordan, David Starr. The complete book of fishes. N. Y., Appleton, 1925, xv, 773 p., 673 illus. and 18 col. pls., large 8vo. No bibliog. \$7.50 net.

This has practically the same text as the old edition, which is entitled "Guide to the study of fishes" and was published in 1905, but the colored plates are new. Those of the Pacific salmon and trout are especially good.

"In this volume the writer has tried to compress all that an educated man is likely to know, or to care to know about fishes. * * * Each one of the food and game fishes of the United States is treated with considerable fullness."

2. Kyle, Harry M. The biology of fishes. London, Sidgwick and Jackson, 1926. 412 p., illus., 8vo Bibliog. pp. 373-387. 16s.

This is reviewed in "Science" Vol. 63, for April 23, 1926, p. 428, by David Starr Jordan, who calls it "very complete and useful; in touch with the latest investigations in anatomy and physiology."

3. Meek, Alexander. The migrations of fish. London, Arnold, 1916. xx, 427 p., 12 pls. 128 illus., and maps, Demy 8vo. Bibliographical footnotes and short lists of references at ends of chapters. 18s net.

Presents a systematic review of the results of investigations on the migrations of fish, and states the known facts about the distribution of various species. Not all biologists attribute the same importance to migrations as a factor in fish life, as does Mr. Meek.

4. Menzies, W. J. M. The salmon; it's life story. London, Blackwood, 1925. xii, 211 p., illus., Demy 8vo. Bibliog. pp. 206-208. 21s net.

An account of the life-history studies on salmon in Scotland, especially those made by reading the age from the scales. Authentic, quite readable.

5. Pearse, A. S. Animal ecology. N. Y., McGraw-Hill, 1926. 417 p., no illus., 8vo. Bibliog. pp. 383-412. \$4.00.

The first comprehensive and authoritative book in its field. A general survey, dealing with physical, chemical, and biological factors, animal life in the ocean, in fresh water and on land, intra- and inter-specific relations, the relations of animals and plants, the color relations of animals and the economic aspects of ecology.

ON FISHERIES AND FISHERY INDUSTRIES.

1. Cobb, John N. The canning of fishery products. Seattle, Pacific Fisherman, 1919. 217 p., illus., 8vo. No bibliog. \$7.50.

"The book is written for the cannery operator, and not for chemists or bacteriologists, and as a result has been made as non-technical as possible."

2. Gibbs, W. E. The fishing industry. London, Pitman, 1922. 135 p., illus., 12mo. No bibliog. 4s.

A good short account of the British sea fisheries, chiefly. Chapters on habits of fishes, fishing methods, the herring and cod fisheries, trawling, shellfish, whaling, the curing of fish, and the food value of fish and fish products.

3. Green, Neal. Fisheries of the North Sea. London, Methuen, 1918. 178 p., map, 1 pl., Svo. No bibliog.

An intelligent survey of the North Sea fisheries, their history, value, possibilities and the bearing of scientific investigation on their development, written by a "practical man." A chapter comparing American and English fisheries is included.

4. Hérubel, Marcel A. The sea fisheries: their treasures and toilers. Translated by Bernard Miall. Ed. 2, 1920. London, Unwin. (Edition 2 has 3 illus., Demy Svo. Bibliog. pp. 353-394) (Edition 1, 1912, has 366 p., no illus., Demy Svo. Bibliog. pp. 353-358).

Appendix contains a list of principal fishing grounds and ports. Calls attention to the "lamentable conditions" of the French marine fisheries, and seeks the most efficacious remedies. Chapters on edible species, fishing grounds, causes of depletion, fishery laws, science and the fisheries, fishing boats and methods, the fisheries of the great fishing nations, markets, etc. A good general book on sea fisheries (exclusive of those for shellfish and crustaceans).

5. Howell, G. C. L. Ocean research and the great fisheries. Oxford, The Clarendon Press, 1921. 220 p., illus., Svo. Bibliog. pp. 208-211. 18s net.

A survey of the main fisheries in the North Sea, emphasizing the relation of scientific research to their proper regulation, and pointing out the importance of adequate statistics.

6. Jenkins, James T. The sea fisheries. London, Constable, 1920. xxxi, 299 p., illus., Svo. Bibliog. pp. 284-288. 24s net.

Collects in a single volume discussions of many branches of fishery research and administration; treats of statistics, fishing methods, legislation, life-history of representative species, shellfish, education of fishermen, value of scientific research, colonial fisheries, etc. The best book of its kind on British fisheries.

7. McFarland, Raymond. A history of the New England fisheries. N. Y., Appleton, 1911. 457 p., 3 maps, Svo. Bibliog. pp. 338-363. \$2.00.

"Aims to show the development and the importance of the New England fisheries from pre-colonial days to the present time." Little attention is given to the whale fishery since this is adequately treated in other books.

8. Tressler, Donald K. Marine products of commerce. N. Y., Chemical Catalog Co., 1923. 762 p., 300 illus., Svo. Good lists of references at the ends of chapters. \$9.00.

"This book is designed for both the scientific and the practical man; it attempts to give the chemist and the biologist a general survey of the fishery industries, pointing out their relative importance, indicating their location, and describing the methods in common use."

Concerns the "acquisition, handling, biological aspects, and science and technology of the preparation and preservation" of marine products. The best and most comprehensive book in its field.

In the appendix are given statistics of the U. S. fisheries, and a list of the common names and descriptions of commercially important marine animals in the waters of the U. S. and Alaska.

ON AMERICAN FISHES.

1. Goode, G. Browne. American fishes; a popular treatise upon the game and food fishes of North America with special reference to habits and methods of capture. Ed. 2, revised and enlarged by Theodore Gill. Boston, L. C. Page, 1903. lxxviii, 562 p., 6 col. pls., and numerous illus., 8vo. No bibliog. \$6.00.

There is an index of common as well as of scientific names. Lists of the fishes of the different regions are given. Entertaining as well as authoritative. Frequent references to the observations of early anglers, and quotations about fish from poetry, enliven the text.

2. Jordan, David Starr and B. W. Evermann. American food and game fishes. N. Y., Doubleday, 1908, i, 572 p., illus., large 8vo. No bibliog. \$4.50.

"A popular account of all the species found in America north of the equator, with keys for ready identification, life histories, and methods of capture." This book aims to be "useful and entertaining to anglers, to commercial fishermen and dealers in fish and fishery products, to teachers and others who wish to inform themselves regarding our vast array of food and game fishes, and to the multitude of intelligent men and women who have an interest in nature and nature study."

ON WHALES AND WHALING.

1. Beddard, Frank E. A book of whales. (The Progressive Science Series) London, Murray, 1900. 320 p., illus., 8vo. No bibliog. \$1.75.

A comprehensive general work on whales. It attempts to illustrate the biological generalization of the intimate relationship between structure and environment by means of this group of animals.

2. Jenkins, James T. A history of the whale fisheries. London, Witherby, 1921. 336 p., illus., 8vo., Bibliog. pp. 318-331. 18s net.

The main facts of the progress of the whaling trade have been marshalled in this book. Conservation is urgently counselled.

ON FISH COOKERY.

1. Spencer, Evelene, and John N. Cobb. Fish Cookery. Boston, Little, Brown, 1921. 364 p., no illus., 8vo. No bibliog. \$2.00.

"Six hundred recipes for the preparation of fish, shellfish and other aquatic animals, including fish soups, salads, entrees, and accompanying sauces, seasonings, dressings and forcemeats."

ON THE HISTORY OF FISHING.

1. Radcliffe, William. Fishing from the earliest times. Ed. 2, rev. N. Y., Dutton, 1926. [Ed. 1 (1921) has xvii, 478 p., illus., Med. 8vo.] 21s net.

This is a scholarly but very entertaining book on the history of angling in Greece, Rome and ancient Egypt, Assyria and China. The revised edition is said to contain a bibliography, and several new illustrations.

STORIES ABOUT SEA ANIMALS.

1. Bullen, F. T. *Denizens of the deep*. N. Y., Revell, 1904. 430 p., illus., 8vo. No bibliog. \$2.50.

"Intimate personal details of the every-day lives" of sea beasts, such as whales, walrus, seals, turtles, giant squids, albacore, mackerel, etc. "Based very largely upon personal observation, buttressed by scientific facts and decorated by imagination."

ON OCEANOGRAPHY AND ITS RELATION TO FISHERIES.

1. Fowler, G. Herbert. *Science of the sea*. London, Murray, 1912. 470 p., illus., Cr. 8vo. Bibliog. pp. 434-437. 6s net. A revised edition is in preparation.

This book was prepared by the Challenger Society and is addressed primarily "to those who are willing to take observations, but fear that a lack of scientific training will render their work or their collections worthless." Elementary. "The object of the volume is severely practical * * * written in language which, so far as possible, takes no previous scientific training for granted."

Appendices contain a list of the marine stations of the world, a list of the firms dealing in oceanographic supplies, and synoptic classification tables of plants and animals.

2. Herdman, William A. *The founders of oceanography and their work; an introduction to the science of the sea*. London, Arnold, 1923 xii, 340 p., 29 pls., Demy 8vo. No bibliog. 21s net.

"The book is one of great freshness and charm, much of which is due to the impress of the author's personality. * * * He has proved himself an excellent advocate of his young science of oceanography."

3. Jenkins, James T. *A textbook of oceanography*. New York, Dutton, 1921. x, 206 p., illus., 8vo. Bibliog. pp. 199-202. 15s net.

Not unduly technical. Review of modern methods of oceanographical research and their chief results. Designed as a text for use in schools. Chapters on general physiographic features of oceans, deposits and bottom fauna, waves, tides, currents, etc.

4. Johnstone, James. *Conditions of life in the sea. A short account of quantitative marine biological research*. Cambridge, University Press, 1908, viii, 332 p., 29 illus., 3 maps, 8vo. Bibliog. pp. 316-319. \$6.00.

Chapters on life in the sea, the sea fisheries, quantitative plankton investigation, distribution of plankton, the productivity of the sea, bacteria in the sea, the circulation of nitrogen, and conditions of marine life.

5. Johnstone, James. An introduction to oceanography with special reference to geography and geophysics. London, University Press of Liverpool, 1924. ix, 351 p., 64 figs. Bibliog. pp. 337-342. 15s net.

The author aims to deal with oceanographical science in a general way and to give a summary account of marine science from the physical side.

6. Johnstone, James. A study of the oceans. London, Arnold, 1926. viii, 216 p., maps, 8vo. Bibliog. p. 208. \$3.75.

This is reviewed in "Nature" for July 17, 1926, on page 79. It "reads like a series of semi-popular lectures" on modern oceanography, the geological history of the ocean beds, and early contributions to geographical science.

7. Murray, John and Johan Hjort. The depths of the ocean. London, Macmillan, 1912. xx, 821 p., profusely illus., 8vo. No bibliog. 28s net.

This includes a general account of the cruise of the Norwegian steamer "Michael Sars" in 1910, and in addition it is a fairly complete treatise on recent advances in oceanography. Though not absolutely up to the minute, it is probably the most comprehensive as well as the most interesting book on oceanography yet published.

8. Thomson, C. Wyville. Voyage of the Challenger. The Atlantic. A preliminary account of the general results of the exploring expedition 1873-1876. N. Y. Harpers, 1878. 2 vols. No bibliog. Vol. I has xx, 391 p., 110 illus., 8vo.; vol. II has 340 pages, illus., map, plates, 8vo. \$12.00. (Out of print.)

"One of the most deeply interesting and fascinating books ever published."—*Nature*.

Appendices contain meteorological tables, tables of depths and sea temperatures, and tables of specific gravity determinations.



EDUCATIONAL FILMS AND LANTERN SLIDES OF THE

CALIFORNIA FISH AND GAME COMMISSION.

The following slides and motion picture films may be obtained free of charge by fish and game protective associations, schools, boy scouts, farm bureaus and other responsible organizations. They depict the fish, bird and animal life of the state and are designed to stimulate an interest in the conservation of our natural resources.

A capable lecturer is available to explain the pictures, give useful information as to the life and habits of the different animals shown, and to emphasize the need of conserving wild life resources.

As a part of the Commission's educational program, these pictures and the services of the lecturer are furnished free of charge, but it is expected that a suitable hall, lantern and competent operator will be provided. Address all communications to the Fish and Game Commission, Postal Telegraph Building, San Francisco, California.

MOTION PICTURE FILMS (1000-FOOT REELS).

- Reel 1A. **Life History of Steelhead Trout.** (a) Hatchery operations. (b) Fishing scenes on Williamson River. (Salisbury film.)
- Reel 1B. **Life History of the Steelhead Trout.** (a) From the artificial spawning to the hatching of the eggs and catching of the adult fish in a mountain stream. (b) Valley fishes.
- Reel 1C. **Life History of Steelhead Trout.** (a) Hatchery operations. (b) Catching large steelhead on the Eel River. (c) The angler at work. (Prizma colored film.)
- Reel 1D. Similar to above. (Prizma colored film.)
- Reel 2A. **The Salmon, King of Fishes.** (a) Spawning operations on the Klamath River. (b) Mount Shasta fish cultural operations.
- Reel 2B. **The Salmon, King of Fishes.** (a) Spawning operations on the Klamath River. (b) Fishing scenes on Klamath River. (c) Klamath Indian dances.
- Reel 3A. **The Tuna Fishery at San Pedro.** Showing the whole industry from the capture of the fish to the finished canned product.
- Reel 4A. **The Monterey Sardine Fishery.** (a) Sardine boats. (b) Canning methods.
- Reel 5A. **Cormorant, White Pelican and Heron Rookeries.** At Clear Lake, California, showing nests, eggs, young and adults.
- Reel 6A. **Nesting Birds of the Farallone Islands.** (a) A whaling vessel in action. (b) Murres and puffins. (c) Sea lion and seal rookeries.
- Reel 6B. **Nesting Birds of the Farallone Islands.** Showing cormorants and western gulls.
- Reel 6C. **Birds of the Farallone Islands.** Showing murres, gulls and sea lions, brown pelicans.
- Reel 7A. **Predatory Birds.** Showing home life of osprey, bald eagle, golden eagle, turkey buzzard and horned owl.
- Reel 8A. **California Waterfowl.** (a) Ducks and geese in the Sacramento Valley. (b) Ducks on California's oldest game refuge. (c) Nesting waterfowl.

- Reel 8B. California Wildfowl. (a) Mallards, pintail, canvasbacks. (b) Geese in flight. (c) Whistling swans. (d) Clapper rail.
- Reel 9A. Upland Game Birds. (a) Bandtailed pigeon. (b) Sierra grouse. (c) A California quail hunt.
- Reel 10A. California Song Birds. Showing bush-tit, house wren, humming birds and stellar jay.
- Reel 10B. Non-Game Birds of California. Black crowned night heron, russet-backed thrush, chickadee, western mocking bird.
- Reel 11A. Forest Animals. (a) Black bear. (b) Treeing and roping of mountain lion.
- Reel 12A. Game Mammals of California. Showing bear, deer and elk.

LANTERN SLIDES.

COMMON BIRDS.

- | | |
|---|--|
| 57. Bittern, showing protective coloration. | 53. Meadowlark, western, young in nest. |
| 17. Blackbirds, Brewer, young. | 34. Mockingbird. |
| 18. Blackbirds, red-winged. | 76. Murre, California, colony. |
| 36. Bluebird. | 74. Nuthatches. |
| 37. Bluebird, western, at nest. | 65. Nuthatch, white-breasted and red-breasted. |
| 93. Bush-tits. | 20. Oriole, Bullock. |
| 28. Butcherbird. | 19. Oriole, Bullock, nest of. |
| 6. Buzzard, turkey, young. | 66. Oriole, hooded, nest of, with two eggs of cowbird. |
| 7. Buzzard, turkey. | 87. Osprey. |
| 43. Chickadee, Santa Cruz, in Golden Gate Park. | 8. Owls, barn, young. |
| 59. Condor, California. | 9. Owls, barn, young. |
| 51. Creeper. | 4. Owl, dusky horned. |
| 15. Crow. | 88. Owl, great horned, on nest. |
| 58. Eagle, bald. | 60. Owls, saw whet. |
| 2. Egrets. | 89. Owl, screech in hollow. |
| 77. Flicker at nest. | 41. Pelican, white, on Clear Lake. |
| 78. Flicker at nest. | 14. Phoebe, black. |
| 79. Flicker and young in nest. | 46. Roadrunner, on nest. |
| 80. Flicker leaving nest. | 47. Roadrunner, with lizard. |
| 81. Flicker and young in nest. | 61. Robin. |
| 82. Flickers, young on tree. | 35. Robin, western, young. |
| 83. Flicker, feeding young. | 49. Robin, singing. |
| 10. Flicker, red-shafted. | 12. Sapsucker, red-breasted. |
| 11. Flicker, red-shafted at nest. | 48. Sapsucker, Williamson, at nest. |
| 42. Goldfinch, green-backed. | 54. Sapsucker, yellow-bellied. |
| 45. Goldfinch, green-backed on nest. | 29. Shrike, on nest. |
| 55. Grebe, pied-billed. | 63. Solitaire, Townsend. |
| 56. Grebe, pied-billed and nest. | 64. Solitaire, Townsend, nest of. |
| 75. Grosbeak, black-headed. | 38. Sparrow, English. |
| 70. Grosbeak, evening. | 38½. Sparrow, English. |
| 3. Gull, herring. | 39. Sparrow, English. |
| 40. Hawk, Cooper. | 44. Sparrows, English. |
| 85. Hawk, marsh. | 67. Sparrows, song, a pair of. |
| 5. Hawk, red-tailed. | 91. Sparrow, song, feeding young. |
| 94. Hawk, sparrow, male. | 52. Swallow, tree, feeding young. |
| 72. Hawk, western red-tailed, in defense posture. | 62. Thrush. |
| 1. Heron, great blue. | 27. Towhee, California. |
| 16. Heron, great blue. | 71. Towhee, California. |
| 50. Junco, slate colored (snow bird). | 86. Vulture, California. |
| 13. Kingbird. | 68. Warbler, Audubon. |
| 84. Kingfisher, belted, young. | 69. Waxwing, Bohemian. |
| 92. Lazuli bunting male. | 30. Waxwing, cedar. |
| 23. Linnnet. | 73. Woodpecker, downy, on food stick. |
| 24. Linnnet, on nest. | 90. Woodpecker, hairy. |
| 25. Linnnet, feeding nestlings. | 33. Wren, Parkman. |
| 21. Meadowlarks. | 31. Wrens, Parkman, young. |
| 22. Meadowlark, western, young. | 32. Wren, Parkman, on nest. |

GAME BIRDS.

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|--|--|
| <p>237. Avocet and black-necked stilt.
 210. Curlew, Hudsonian.
 249. Curlew, Hudsonian.
 227. Dove, mourning.
 219. Ducks, Fulvous Tree, at Game Farm.
 201. Duck, mallard.
 209. Ducks, pintail.
 212. Ducks, pintail, juvenile.
 217. Ducks, ruddy.
 202. Duck, wood.
 202a. Duck, wood.
 214. Ducks, Alameda County Infirmary Reservoir, winter of 1914.
 215. Ducks on pond at State Game Farm, Hayward, California.
 213. Ducks on Lake Merritt.
 222. Ducks on lawn, Lake Merritt.
 224. Ducks on lawn, Lake Merritt.
 223. Ducks flying, Lake Merritt.
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 232. Grouse, sage (sage hen).
 233. Grouse, sage hen, dancing.</p> | <p>234. Grouse, Sierra.
 247. Merganser, "shell drake."
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 208. Pheasant, ring-neck.
 229. Pigeon, band-tailed, nest of.
 235. Ptarmigan on snow and on nest.
 206. Quail, mountain.
 221. Quail, mountain at Game Farm.
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 204. Quail, valley.
 205. Quail, valley.
 216. Quail, valley, with Ruth Dirks.
 218. Quail being fed in yard, Elsinore.
 211. Rail, California clapper.
 236. Rail, Virginia, approaching nest.
 228. Sandpiper, spotted.
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 243. Snipe, Wilson's, on nest.
 237. Stilt, black-necked and Avocet.
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 207. Turkey, wild.
 231. Widgeon, baldpate and European.
 246. Willet.
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 238. Yellowlegs, lesser.</p> |
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| <p>303. Blackbirds over Kafir corn.
 301. Egyptian corn injured by blackbirds.
 302. Kafir corn injured by blackbirds.
 304. Barley injured by blackbirds.
 316. Barley injured by blackbirds.
 317. Barley injured by blackbirds.
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 321. Life history of a butterfly.
 311. Meadowlark, western.
 306. Meadowlark with cutworm.
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 307. Mandibles of crickets from stomach of meadowlark.</p> | <p>308. Stomach contents of meadowlark.
 309. Stomach contents of western meadowlark.
 314. Stomach contents of western meadowlark—beetles.
 315. Diagram showing food of western meadowlark by the month.
 310. Holes bored in grain field by a meadowlark.
 323. Barn owl with pocket gopher.
 322. Stomach contents of western robin.
 312. Zeiss binocular used in stomach examination.
 313. Method of estimating stomach capacity.</p> |
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COMMON MAMMALS.

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| <p>502. Chipmunk, alpine.
 507. Opossum.
 509. Opossum.
 510. Otter, river.
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 Raccoon climbing tree.
 501. Rat, kangaroo.
 504. Squirrel, red or chickaree.
 512. Skunk, little spotted.
 506. Whale, cutting up, at Moss Landing whaling station.
 513. Wild cat in trap, Mendocino County.</p> |
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BIG GAME MAMMALS.

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| 641. Antelope herd on Mt. Dome. | 604. Deer, mule-tail, near Mt. Whitney. |
| 643. Antelope, prong-horned, lying down. | 605. Deer, mule, from Nevada (Alum Rock, San Jose). |
| 625. Bear, black, near Camp Ahwahnee, Yosemite Valley. | 606. Deer, mule, head of. |
| 639. Bear, black cub feeding from bottle. | 603. Deer, Michigan white-tailed (Los Angeles Park). |
| 630. Bear, grizzly. | 614. Deer, San Benito County. |
| 642. Bear, grizzly. | 623. Deer, four at Salt Lick, Hayfork River, Trinity County. |
| 627. Bear, grizzly, hide. | 628. Doe with fawns. |
| 632. Beaver, American. | 621. Elk, Roosevelt in California. |
| 602. Deer, black-tailed, State Game Farm. | 631. Fisher. |
| 613. Deer, black-tailed, resting. | 608. Jerky, Lake County. |
| 616. Deer, black-tailed, Santa Cruz County. | 609. Jerky, Lake County. |
| 617. Deer, black-tailed, Santa Cruz County. | 635. Lion, mountain. |
| 622. Deer, black-tailed, State Game Farm. | 636. Lion, mountain and kitten. |
| 610. Deer, coast mule, San Diego Park. | 637. Lion, mountain, and Jay Bruce. |
| 611. Deer, coast mule, San Diego Park. | 638. Lion, mountain, and Jay Bruce and his dog Eli. |
| 612. Deer, coast mule, San Diego Park. | 640. Sheep, desert mountain group. |
| 615. Deer, mule, in Sequoia National Park. | |

FISH.

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| 1253. Barracuda, boatload of, at San Pedro. | 1207. Shad. |
| 1208. Bass, black sea. | 1263. Smelt, little or Grunion. |
| 1229. Bass, black, seining from overflow, Yolo Basin. | 1258. Sunfish killed in irrigation ditch due to lack of screening. |
| 1206. Bass, striped. | 1237. Trout, eastern brook. |
| 1260. Clams, Pismo, at Watsonville. | 1202. Trout, German brown. |
| 1236. Cutthroat, or Tahoe trout. | 1241. Trout, Loch Leven. |
| 1263. Grunion, or little smelt. | 1242. Trout, Loch Leven, catch of. |
| 1203. Salmon, quinnat. | 1201. Trout, rainbow. |
| 1246. Salmon, five species on Pacific Coast. | 1225. Trout, rainbow, catch of. |
| 1205. Salmon and trout showing diagnostic characters. | 1257. Trout, 3-lb. rainbow leaping waterfall near Downeyville. |
| 1204. Salmon fishermen. | 1235. Trout, steelhead. |
| 1230. Salmon in Fish Creek, Ketchikan, Alaska. | 1243. Trout, steelhead, killed by pollution, Pajaro River. |
| 1247. Salmon spawning, Klamath River. | 1244. Trout, steelhead, killed by pollution, Pajaro River. |
| 1249. Salmon, marked. | 1236. Trout, Tahoe or cutthroat. |
| 1250. Salmon, scale of, showing annuli. | 1205. Trout and salmon, showing diagnostic characters. |
| 1251. Salmon, scale in fifth year. | 1224. Trout distribution, 1915 (cut showing relative figures). |
| 1252. Salmon scale showing annuli. | 1214. Trout eggs for shipping. |
| 1212. Salmon hatchery at Baird. | 1217. Trout planting, American River. |
| 1255. Sardines, boatloads of, at San Pedro. | 1213. Trout, spawning, Sisson Hatchery. |
| 1256. Sardines, age classes. | 1254. Tuna, unloading at cannery. |
| 1259. "Scuds," favorite food of trout in mountain lakes. | |

CONSERVATION.

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| 1000. Are you the man on the fence? | 1017. Eroded slope. |
| 1001. California surrounded by non-sale states. | 1018. Erosion in abandoned fields. |
| 1002. Non-sale states (Aug. 19, 1914). | 1019. Fire in National Forest, Plumas County. |
| 1003. How to vote. | 1020. Burned stump land. |
| 1004. Market hunters at Los Banos. | 1021. Forest fire in Wyoming. |
| 1005. Sportsman's bag. | 1022. Reproduction after fire. |
| 1006. Market hunters and bag. | 1023. Band-tailed pigeon hunters. |
| 1007. Feeding valley quail at Bishop, Cal. | 1024. Boy making a bird box. |
| 1008. Winter feeding of quail, Inyo Co. | 1025. Bird boxes made from odds and ends. |
| 1009. Winter feeding of quail. | 1026. Artistic bird boxes. |
| 1010. Valley quail being fed, Bishop, Cal. | 1027. Bird boxes for woodpeckers. |
| 1011. Deer (National Forest, Colorado). | 1028. Nesting boxes in place. |
| 1013. Robins killed by Italians. | 1029. Martin houses. |
| 1014. Italian bird net. | 1030. Devices to protect birds from cats. |
| 1015. Sheep on way to winter range. | 1031. Passenger pigeon, male. |
| 1016. Area denuded through grazing. | |

NATURE STUDY.

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| 1501. Blind school, Royal Hunting Lodge, Deer Park, Copenhagen. | 1507. Nature study in the field, fifth grade, Sacramento. |
| 1502. A botanizing trip in Denmark. | 1508. San Francisco Bay and Ferry Building. |
| 1504. An outdoor school in Leubeck. | 1509. Nature study class in Yosemite Valley. |
| 1505. Outdoor class studying history, Hildesheim, Germany. | 1510. Field excursion in Yosemite. |
| 1506. Fifth-graders being taught conservation, South Side Park, Sacramento. | 1511. Children's nature study class, Yosemite. |

CALIFORNIA FISH AND GAME.

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

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"Legislation is only a handy man of education and unless accompanied by favorable public sentiment will fail of its object."—Missouri Game and Fish News.

TIME ELEMENT IMPORTANT IN CONSERVATION.

It takes nature centuries to build for us the natural resources which we enjoy. We continually cut down trees 300 and 400 years old, thinking that we can readily replace the timber in a few years; we continually harvest a large crop from our wild life resources, expecting that replacement will take place within a short length of time; we take boatloads of fish from the ocean expecting replacement within a few years. Only occasionally does man stop to consider what an intricate thing replacement really is, and the time element necessary. Yet, this very thing is the fundamental truth upon which all conservation measures should be based.

A recent article in American Forests and Forest Life (Vol. 32, No. 391), calls attention to the destruction of mountain meadows, due to overgrazing and the difficulty in rehabilitating a meadow so destroyed. The article is particularly impressive, because it is written by a cattleman, who is dealing with first-hand information and not with hearsay. He points out that an eight-year attempt to reestablish overgrazed meadows has resulted only in a crop of weeds.

It was more than five years ago that a serious epidemic reduced the gray squirrel population to a minimum. At the present time but slight increase in numbers is to be noted in localities where the disease was prevalent. Consequently, in spite of the fact that the squirrel is

a prolific breeder and that it has had total protection for a period of five years, replacement is not in sight.

The sea otter was given total protection in 1913, but the species is still a candidate for extinction. The sturgeon shows little sign of a return to abundance after a number of years of total protection.

When the length of time it takes to replace natural resources is considered, the need for more careful use and more careful thought for the future is evident. We can not long continue to harvest recklessly a crop that takes centuries to grow, nor dare we contemplate substituting weeds for grass, rats for rabbits, or English sparrows for goldfinches.

PREDICTIONS OF GAME ABUNDANCE NEEDED.

Government experts are able to predict the exact height of each tide expected during the month or year; anyone interested in the actual height of the water is able to get accurate data. The weather bureau makes useful predictions as to weather conditions; anyone who wishes to know what the prospects are for sunshiny or cloudy weather can get reliable information. Certain men employed by the United States Department of Agriculture annually collect data to enable the department to forecast unusually large crops of any commodity or any shortage. Science has helped us to secure data sufficiently accurate to make useful predictions. If we turn our attention to fish and game, however, we discover that little is done to collect information necessary for predictions as to abundance or scarcity. Everyone knows that wild things of every kind have cycles. Certain years they appear in abundance and other years in less abundance. Many factors control these fluctuations. If conservation organizations should follow the lead of other departments in attempting to foretell the status of various species from year to year wiser use of natural resources would be obtained. Even of more import than the actual prediction is the knowledge of factors concerned in increase or decrease.

Other states have taken one step in the direction of securing necessary data by taking a game census. The kill must bear a direct relation to the annual increase. California plans a similar census which will be an important advance. Then must come studies of life history and normal rate of increase making comparison possible.

STRIPED BASS ONCE MORE.

As was indicated in the leading editorial of the Striped Bass Number, the plan was to follow the more technical article which appeared in that number by one giving the viewpoint of an actual fisherman. By good fortune an inveterate striped bass angler, who fishes regularly at the mouth of the Salinas River, was secured to write exactly what he thought about striped bass. Even though the author may not be able to prove every statement made, he at least has drawn some conclusions from his own observations and has frankly given them. Some of the points brought out by Mr. Hubback give food for thought and remind us that much is yet to be learned of this erratic game fish.

DEPUTIES RECEIVE NEW MANUAL.

A manual for deputies of the Fish and Game Commission was issued May 1, 1914. This has long been out of print and the Commission has until now been unable to put into the hands of its employees, a dependable reference manual relative to law enforcement. A revised edition of this manual was issued on July 1, 1926. Information useful to a deputy fish and game commissioner is grouped under the headings: qualifications, relations with other officers, arrests, search and seizure, warrants, making a case. Through the courtesy of the National Automobile Club, each deputy was furnished with a National Automobile Service Guide containing maps and full auto information. The two manuals bound in a loose leaf leather folder makes a handy reference work for each field man.

SOMETHING MORE THAN PROTECTION.

The thought lying behind the well-known statement of the martyred Miss Cavel, "something more than patriotism," leads us to use a similar phrase relative to methods of fish and game conservation. "Something more than protection" is needed to assure us a permanent supply of wild life. Visit any reclaimed marsh where you formerly hunted and no matter how much protection has been given the waterfowl in recent years, you will find no birds to shoot. The increasing protection that has been given ducks and geese does not assure large flocks of these birds to areas like Lower Klamath Lake at the present time. The something more than legal protection, which is absolutely needed, is to be found behind the words,

"food supply, and cover." One wonders sometimes if we are not over-emphasizing the matter of legal protection and forgetting almost entirely some of the fundamental biological needs of a species.

Fortunately, one who follows editorials of conservation will discover that within the last two years, less has been said about new laws and more said about furnishing game with suitable food and cover. The sooner we recognize the biological needs of wild life, the sooner we may expect really to attain conservation.

PIKE AND TROUT.

The Sacramento pike, or squaw fish, is a member of the minnow family and grows to be one of the largest of minnows. It is native to practically all of the low-land streams of the state and most experienced fishermen have occasionally caught the fish with hook and line. Among many anglers the fish does not bear a savory reputation, for it is believed to be predatory and to feed upon trout. Many a man will explain that he has actually seen pike destroy trout, and he backs up his observations by pointing out that where pike abound in a stream, trout are seldom found. In southern Monterey County a complaint is continually made that in dry years, when the Arroyo Seco and San Antonio have low water, entire pools in the lower reaches are filled with pike, where formerly they were filled with trout. Certainly the relations between this fish and trout should be investigated before a wholesale method is employed for the destruction of pike. Should any reader of this magazine have worthwhile information relative to the relations existing between these two fish, the Fish and Game Commission would be glad to receive it.

AYU EGGS IMPORTED.

A shipment of ayu eggs arrived from Japan on November 1st, in charge of Dr. Ishikawa of Tokio. Unfortunately all were dead on arrival. Half of the shipment was sent to the Mount Shasta Hatchery, Siskiyou County, and the other half to the Brookdale Hatchery in hopes that a few might be saved. However, like two or three former shipments, they arrived covered with fungus and the embryos were all destroyed before they reached San Francisco. The eggs were inspected on arrival as well as at the Brookdale Hatchery by Mr. G. A. Coleman, biologist, and at the Mount Shasta Hatchery by Superintendent G. H. Lamb-

son, and all the eggs were found to be dead.

Mr. Coleman's report included the following statements: "The eggs were found to be in a very poor condition, the three top trays in each case being covered with a white fungus. The middle three trays were not so bad with fungus and the four in the bottom which were entirely immersed in water were apparently free from fungus. The eggs in the water had a natural color but those in the upper trays were nearly all white. Examination with the microscope showed that the eggs in the lower trays had developed embryos in about one-third of them, the rest being apparently undeveloped. A very few in the middle trays showed signs of embryos but none in the three upper trays. The temperature in the room in which they were kept on board ship (a refrigerator room) was forty-five degrees F. The temperature between the trays in the boxes was forty degrees F. when taken from the ship and the same next morning after shipment to the Brookdale Hatchery. Dr. Ishikawa said he thought they were kept too cold.

"A place was prepared in an outside pond at the Brookdale Hatchery where they could have plenty of fresh water and twenty trays placed therein and covered with the cloth covers used on hatchery trays. Ten trays were placed in one of the hatchery troughs inside. Temperature of the water in pond under eggs at 1 p.m., November 2, was 60 degrees F. Temperature of water in hatchery trough at 1 p.m., November 2, was 52 degrees F. Examination on November 19 showed no sign of life in any of them—most had turned white.

"Examination of the mats in the trays showed them to be full of fungi of several varieties—protozoa (Paramecium, etc.), and of bacteria. **RESULT:** a complete failure. There were six cases in the shipment, three being shipped to Mount Shasta and three to the Brookdale Hatchery."

This is the third attempt made to introduce the ayu into California. Until greater precaution is used in destroying the spores of fungus and looking after the packing of the eggs, there is little hope for success.—W. H. Shebley.

CHUMMING IS LEGAL BUT—

It has been reported on good authority that one dealer situated on the bank of Big Bear Lake in southern California received last season a shipment of fifty cases of corn and peas. Let it be understood that this shipment was not designed

for human consumption, but for fish consumption, for more and more it has become the custom at this lake to chum trout. This is accomplished by dumping several cans of corn and peas in a particular place to entice the fish to that portion of the lake and then catch them on hook and line. Probably this is on a par with baiting ducks to a pond. Nevertheless, when unfair advantage is taken of wild life, greater depletion is the result. If we play fair, good sport will continue for a long period.

CALIFORNIA SALMON MAY FEED OFF BRITISH COLUMBIA COAST.

Several years ago some cooperative tagging experiments with salmon were planned by the International Pacific Salmon Investigation Federation. This organization has coordinated the salmon work along the Pacific coast and acts as a clearing house for advice and information. At a meeting held in Seattle on December 2, reports were given which tend to show that salmon of several species from along the entire Pacific coast may find feeding grounds off the British Columbia coast. Extensive tagging experiments have been carried on by British Columbia with a remarkably fine percentage of returns. Of most interest, is the news that one king salmon and one silver salmon tagged in California were secured in the waters off British Columbia. Nearly 50 per cent of the tagged fish taken have been from the Columbia river or southward.

Resolutions passed at a recent meeting of the committee are:

Whereas, a constant and nation-wide propaganda has been maintained in newspapers, engineering and technical magazines, etc., conveying the impression, based on the partial success of an experimental fishway at the Baker River dam near Concrete, Washington, that a complete solution has been reached of the problem of safeguarding salmon runs jeopardized by the construction of dams; and

Whereas, and in the opinion of this federation, no solution of this problem has yet been reached that can properly be considered as of general application; and

Whereas, in the opinion of the federation, the problem connected with each dam is individual and distinct; and

Whereas, much of the work at the Baker River dam so far has been experimental, and the results there are not yet conclusive; therefore be it

Resolved, that the International Pacific Salmon Investigation Federation, at this meeting of December 2, 1926, strongly disapproves the propaganda above men-



FIG. 8. A 32½-pound mackinaw trout taken at Homewood on Lake Tahoe in the spring of 1924. The mackinaw, which grows largest of all American trouts, is increasing in numbers in Lake Tahoe.

tioned, as being unwarranted and misleading.

THE WARDEN'S VIEWPOINT.

In the June issue of the *Service Bulletin* the question was asked, "What are the essential qualifications of a good fish and game warden?"

In examining the answers to the different wardens it appears that they have many ideas in common.

Of those who replied, the greatest number emphasized honesty and ability to handle the public; a large number insisted on a thorough knowledge of the game laws and pointed out the need of courtesy and the ability to command the respect and cooperation of citizens and officials. Fearlessness, fairness and education of the public were points stressed by many others.

Following are three of the replies, quoted in full. They are typical of the many that were received and give some idea of the high standard of ideals prevalent among our fine corps of game wardens:

"The position of a fish and game warden is not merely a job as many would think, but I would say 'a profession of no small degree.' First of all he is possessed or gifted with a natural love for nature and its living beings. He is physically fit to endure the hardships which may come before him. He is fearless, efficient, loyal and honest. His heart and soul are in his work. He has a wilful desire to perform his duties at all hours of the day and night. He is always alert and able to determine the direction of a shot or sound. He is courteous except when the opposite is necessary. He understands that he is the arresting officer and not the judge, therefore he does not impose the penalties. He respects and gains the respect of the public. He has made a study of human nature and knows how and when to approach offenders. He is naturally curious in his line of work, and when in pursuit of violators he shows good judgment, detection and determination.

He destroys predatory birds and animals whenever the opportunity presents itself. He always bears in mind that 'silence' is very important and generally necessary when he pursues violators in a district where he is known. He has a general knowledge of law procedure, and is thoroughly familiar with the fish and game laws, and how they should be enforced. He is continually seeking the cooperation of all those who may be able to assist him. He dismisses any feeling of friendship or favoritism when he performs his duty. He is a firm believer of conservation through education, and accepts opportunities to talk conservation both publicly and privately. He knows the great value of publicity,

and therefore he writes articles for the newspapers. He is continually trying to improve his district by figuring out ways and means whereby he can cut down the number of violations, bearing in mind that the prevention of the crime is always to be preferred.

He knows that a lawful district with few arrests is better than a lawless district with many arrests, and he works accordingly.

This is my idea of what the essential qualifications of a good fish and game warden should be."

"A game warden should always bear in mind that he is serving the public and that cooperation is the most essential factor of his work. This can be secured by a spirit of helpfulness rather than an officious attitude. Most people will listen to reason if approached in the right way. It is expected that a game warden will be firm in his determination to enforce the fish and game laws, but his firmness will be made more effective if tempered by a due consideration of the rights and privileges of the other fellow."

"A game warden should be fearless in the discharge of his duties; should be honest and fair in his dealings with everyone—rich and poor alike, giving favors to no one.

He should be diplomatic, as much as can often be accomplished by a little diplomacy on his part.

He should ever be on the alert for violators, and honorable in his dealings with all.

A good game warden makes friends for the commission and for his superiors as well as gaining respect for the fish and game laws by his courteous manner whether in the making of arrests or along educational lines, by explaining the various fish and game laws.

At all times, he should aim to win the respect and friendship of the various judges, district attorneys and even of the violators."

WEEDS OR WILDFOWL.

All who have investigated conditions on Lower Klamath Lake in recent years have met the argument of local residents, that the dry lake bottom is furnishing forage for sheep. Inquiry discloses the fact that the grazing consists of a crop of weeds which appear annually on only one part of the lakebed. Much of the lakebed is too alkali to grow even weeds. Since a great deal is made of this in support of the drainage of the lake, it is only reasonable that those interested in bird life should make a comparison as to the actual values, nor need this comparison be devoted to actual figures, for that is the easiest method of comparison.

The following argument is still more to the point. Sheep can be reared most satisfactorily on cultivated ground. Alfalfa fields and stubble furnish the best of food. On the other hand, wildfowl can not be reared satisfactorily on similar lands. Large bodies of water are necessary for breeding grounds and for safety. As a consequence, good agricultural lands are the logical location for sheep breeders, whereas lakes and marshes should be allotted for breeding of wildfowl. The sheep industry holds its own, whereas our resources in wildfowl have been greatly on the decline. Unless more careful allotment of lands in relation to wildfowl is made, we shall lose entirely the benefits which accrue from this resource and replace it with some standardized live stock industry.

In the case of lower Klamath Lake, if it is a matter of weeds or wildfowl, can there be any doubt that more people are definitely interested in the saving of wildfowl than in the production of weeds for sheep?

GAME WARDEN'S JOB A DANGEROUS ONE.

The more dangerous employment is, the more carefully it should be protected by insurance. Salaries have been so meager in the case of California wardens that few have been able to satisfactorily protect themselves with insurance. With these facts in mind, the employees of the Commission, at their last annual meeting, appointed a committee to investigate a salary allotment plan of group insurance. After a report of the committee, a plan was worked out and many employees have accepted the opportunity of securing life insurance at low rates and with no need for a medical examination. Arrangements were made with the company handling the largest volume of group insurance to furnish employees a choice of any kind of life insurance, the premium on which is to be deducted from the monthly salary. It is expected that before the end of the year a good proportion of the employees will have taken advantage of the plan selected by the committee.

LOCAL GAME REFUGES.

Probably few realize how often private individuals turn their ranches into game refuges. A recent letter from a man who owns a 700-acre ranch in southern California tells of his interest in the mourning dove and his desire to make his particular ranch a refuge. He states that

the average hunter takes the attitude: "If I don't get them someone else will." His retort is that if they will leave them alone on his ranch, doves will rapidly increase and furnish better sport on surrounding areas. Provided there are not too many such local bird refuges, the end result will be very much worthwhile. Some states are advocating a refuge not only for every county but a small one for every township and with several of the larger ranches in a county set aside as refuges where no hunting is allowed and safe breeding stock can readily be maintained.

TWO SIDES OF A QUESTION.

After one attends a meeting of a fish and game protective association and hears numerous arguments on a question, one at first thought is disturbed with these wordy tilts. But let one visit another meeting and see resolutions railroaded through, as they are occasionally, with but one side of the question discussed and he is ready to appreciate the value in discussion and the desirability of always having both sides of a question presented. When you hear some sportsman refuse to hear the opposition, you may be sure that some of his measures are half-baked and dangerous. All too frequently, organizations rush into undertakings that later they would gladly abandon. No finer check on worthwhile undertakings can be found than that to be secured by free discussion of two sides of the question.

The value of free discussion of fish and game problems was evident at the Second Annual Sportsmen's Convention held at the Whitcomb Hotel, San Francisco, December 9 and 10. The most important deliberations concerned the recommendations of the Fish and Game Study Committee appointed by the California Development Association. With but a few exceptions the recommendations were accepted by the meeting. A splendid group of sportsmen were present and the net result will be a united stand on the more important legislation planned, and a better understanding of game conditions and conservation needs in all parts of the state represented by delegates.

WHALING OPERATIONS START IN SOUTHERN CALIFORNIA WATERS.

The success of whaling operations along the north coast has led to a new venture in southern California. The California Sea Products Corporation, a firm financed by San Francisco capital,

now plans to establish a whaling station with its base at South Bay, San Clemente Island. The intention of this firm is to fish the waters for a radius from fifty to one hundred miles from this center for the blue whale, the oil of which is valuable. The "Lansing" is now being equipped and fitted out in the latest approved style for the utilization of the whales. A fleet of four smaller vessels, known as "killer" ships, will secure the animals. The firm began its operations about November 1st.

BETTER PROTECTION FOR STEEL-HEAD NEEDED.

One of the conservation problems that through the years continues to confront California has to do with the steelhead trout in coastal streams. Not only does the season remain open during the winter time so that larger spawning fish are continually caught, but the season again opens in May and continues open during the summer season. During the summer, few large trout are in the stream and therefore catches are largely limited to three and four-inch young fish, which should be given an opportunity to develop before being caught. Perhaps there are several solutions, but they remain untried with the exception of the attempts to introduce some resident species. The cutthroat trout is being tried out in the streams of Humboldt County. This may eventually produce a larger sized fish and reduce the toll taken of young steelhead. The plan of closing the season during the summer time hardly seems feasible, because of the demand of vacationists for an opportunity to fish coastal streams.

SOME RESOLUTIONS OF THE WESTERN FISH AND GAME COMMISSIONERS' ASSOCIATION.

Among the more interesting resolutions passed by the Western Game Commissioners', meeting held in Boise, Idaho, last August, were the following:

Resolved, That we hereby approve the efforts of our representative to secure adequate and proper federal legislation for the protection of migratory wild fowl throughout the United States and the proper enforcement of existing laws for this purpose and we endorse the Public Shooting Grounds and Marsh Land Conservation Bill now pending before congress, and recommend its early passage. Be it further

Resolved, That Mr. D. H. Madsen, Game Commissioner of Utah, be empow-

ered to represent the Western Association of State Game Commissioners at the coming meeting of the International Association of State Fish, Game and Conservation Commissioners to be held at Mobile, Alabama, for the purpose of assisting in the passage of the Public Shooting Grounds and Marsh Land Conservation Bill.

Resolved, That we again urge our several state legislatures to enact a law which will prohibit the sportsmen of the several states having in their possession to use as bait or for any other purpose, any salmon eggs or imitations of prepared form thereof in any of the public waters of the several states or for any person, company or corporation to sell or offer for sale, any salmon eggs or imitation or prepared form thereof.

We endorse the policy of cooperation evidenced by the Department of Agriculture through its Forest Service in cooperation with the state departments for the protection and preservation of wild life in the National Forests and pledge our several departments to work in harmony with forest officials to this end, but we view with alarm the pending legislation, especially Senate Bill number 1147, which seems to propose additional Federal jurisdiction over the wild life in the National Forests, which in our opinion, are already adequately protected by state and federal legislation. We maintain that the protection of resident game within the several states is a responsibility of the states and that any attempt on the part of the federal government to assume this responsibility is not constructive and might seriously interfere with the splendid spirit of cooperation now existing between the state and federal officials charged with the protection of wild life.

HOW MANY FISH WILL A STREAM SUPPORT.

More and more fish experts are turning their attention to the main biologic factors concerned in the life of various species of fish. A recent report from Canada (Losses in Trout Fry after Distribution, *Science*, 64, pp. 228-229) gives the results of the work of an expert who decided to determine the comparative numbers of different kinds of fish within a known area. The seining of a quarter of a mile of Forbes Brook, Prince Edward Island, Canada, in October, 1925, produced 319 trout, 82 fundules, 33 salmon parr, 16,152 stickleback, making a total of 16,586 fish in this short stretch of stream. "At the same time

only about 1066 trout fry were found alive out of 4020 distributed in this same area in July, 1925." The article calls attention to the fact that this area of stream produces food enough to feed a certain number of fish, just as fifty acres of pasture land feeds only a limited number of cattle. In addition to the tangible factors concerned of food supply and enemies, there are many more intangible ones, such as temperature, oxygen and carbon dioxide content, salinity and intensity of light, pressure and pollution.

Whenever someone turns his attention to carefully planned experiments on the improvement of conditions in a stream in order to furnish biologic necessities and increase production, worthwhile advances in improvement of angling conditions can be expected. Several years ago investigations along this line were begun by the California Fish and Game Commission. A trained biologist was employed and already new knowledge of the food of trout has resulted in improvement in many mountain lakes due to the furnishing of an additional food supply. Complete biological surveys of various lakes and streams have been made and there is continual effort put forth to fit the fish to each stream or lake and artificially improve conditions for the fish wherever possible.

FISH LADDER ON SACRAMENTO RIVER BEING INSTALLED.

Sacramento River salmon will run freely to their spawning beds this year in greater numbers than ever before, due to the construction of a new fishway around the eastern end of the diversion dam maintained by the Anderson-Cottonwood Irrigation District near Redding. Announcement coming jointly from the commission and the irrigation district telling of the adjustment of difference of long standing over this matter will be received with interest by Californians who foresee as a result increased runs of salmon in California streams.

Work on the new fishway, which is to be of the best, modern construction, has already begun. It will be finished in time for the early spring run of salmon. The rest pools forming the fishway are twelve by twenty feet and rise, stairway-like from the bed of the river below the dam to the flood waters impounded above it. Steel and concrete are being used, thus forming a structure which will withstand the rush of waters for many years, and provide access to the spawning beds in upper reaches of the great river for California's finest sporting and food fish.

The agreement between the commission and the district was reached after

numerous conferences between officials of both organizations. The installation is being made in connection with the regular annual repair program of the district.

In the conferences leading up to the solution of the problem the commission was represented by Jack Spencer, director of the Bureau of Screens and Ladders. The entire board of directors of the district represented its clientele.

TREE SQUIRRELS IN THE LAGUNA MOUNTAINS TO RECEIVE WINTER FOOD SUPPLY.

Acting upon reports from the supervisor of the Cleveland National Forest that the acorn crop was an entire failure in the Laguna Mountains and that squirrels would be affected, the San Diego County Fish and Game Protection Association is cooperating with other societies in furnishing an artificial supply of food. A fund is being raised to buy corn. This is to be transported in a forest service truck to the Laguna Mountains and distributed by forest rangers.

The abundance of any species is perhaps more dependent upon food supply than upon any other factor concerned. As a consequence, attention paid to furnishing an artificial supply of food during periods of scarcity is sure to bring about worthwhile results.

BIRD AND ARBOR DAY.

March 7th of each year (the anniversary of the birth of Luther Burbank) has been set aside in California as Bird and Arbor Day.

It is hoped that all schools will observe this day, not as a holiday, but by including in the school work suitable exercises and instruction in the economic value of birds and trees, and the promotion of the spirit of protection toward them.

Suitable material for a program may be found in a Bird and Arbor Day Bulletin which has been published by the Superintendent of Public Instruction. The bulletin contains several articles pertaining to fish and game conservation and is illustrated with cuts loaned by the Fish and Game Commission.

A NEW BOOK ON PHEASANTS.

Everyone interested in pheasants knows that the most dependable and most pretentious reference work is by William Beebe, "Monograph on Pheasants." This monumental work, issued by the New York Zoological Society and its interested patron, Colonel Anthony R. Kuser, is not available to the average pheasant breeder because of the high cost of these splendid

volumes. Only a few of the larger libraries have been able to purchase sets. Pleasing information now comes that the New York Zoological Society plans to publish a two-volume abridged edition of the work in quarto size, with eighteen colored plates and numerous photogravures. Only portions of text which are of general interest will be retained and the more technical parts which would appeal only to the trained scientist will be omitted. All interested in propagation of pheasants will look forward to the publication of this work.

MIGRATION OF BONITOS IN THE NORTH PACIFIC.

David Starr Jordan in a recent article (*Science*, 64, p. 499) calls attention to a notable migration of bonito encountered by A. C. Lovekin, of Riverside, California, in July and August, 1893. During a period of light winds while some hundreds of miles almost due north of Hawaii and about in the latitude of San Francisco, enormous schools of bonito and tuna were seen. "There seemed to be no limit to their number and as far as we could see on all sides the ocean was packed with fish," is the statement made by Mr. Lovekin. For ten or more days they surrounded the ship. A number were easily caught by using a bit of white rag attached to a common fishhook. Some of the larger tuna, weighing up to eighty pounds, were harpooned.

AUDUBON SOCIETY REPORTS ON EDUCATIONAL WORK.

At the annual meeting of the National Association of Audubon Societies, last fall, reports were given summarizing the educational work of the organization. During the preceding year, the staff gave 1500 lectures, the attendance totaling 250,000. The Junior Audubon work has grown until the groups now number 8094 and the membership 327,776. This is undoubtedly the largest and the most constructive work along conservation lines thus far undertaken in the United States. The National Association now has united 864 clubs, and has a total membership of 28,471. Considerable sums of money have been invested in bird sanctuaries in order to safeguard disappearing species. Audubon sanctuaries are now to be found in nine different states.

DEER HUNTERS NUMEROUS IN COAST RANGE.

On the opening day of the deer season last fall, it was estimated that between

twelve hundred and fifteen hundred hunters traveled the Mine Road in the Livermore Mountains. Probably, the herd of hunters exceeded the herd of deer to be found, for the estimated number of deer taken on that day was only twelve.

BIOLOGICAL SURVEY CHIEF SURVEYS THE DUCK SITUATION.

Dr. E. W. Nelson, who, as chief of the Biological Survey, is charged with the administration of the Migratory Bird Treaty existing between Great Britain and the United States, was recently in California completing a tour of inspection of the districts where the mortality of ducks has been greatest. At the meeting in San Francisco of the Associated Sportsmen's Clubs, Dr. Nelson pointed out that in excess of 10,000,000 ducks had died in the west during the past few years due to poisoning contracted in the restricted water areas at key points in the lines of migration.

The worst conditions to be found in the entire country are west of the Rocky Mountains, and, of these, the main points are the Bear River marshes in northern Utah, Malheur Lake in eastern Oregon and the Tule Lake and Lower Klamath Lake areas in northern California. These areas comprise the few in which birds can concentrate in large numbers, but of late years the amount of water taken from the feeder streams for irrigation, reclamation activities, and the natural drought have rendered them swamps in which alkali and kindred poisons have become so prevalent as to kill the birds in colossal numbers.

The duck supply of the west is largely dependent upon these key areas and the solution of the duck problem is to be sought in the restoration of these essential marsh lands. It is essentially a western problem, for the ducks of the west are distinct from those of the balance of the United States. Elsewhere, the birds are holding their own against an ever-increasing number of hunters.

The above three areas supply birds to eleven western states, hence the problem is in a sense a federal one and cannot be solved by a single state alone. The solution lies in a sufficient congressional appropriation to maintain an adequate water supply in these areas.

The first undertaking should be the construction of a dam which would flood a marsh of more than 150 square miles in the Bear River Basin. This would assure a supply of ducks to California and ten other western states.

Next in line of importance is Malheur Lake in eastern Oregon, which would en-

tail the construction of a dam and a series of artesian wells, and following this, some method would be worked out to regain as a breeding and feeding ground more than 10,000 acres in the bed of Lower Klamath Lake. In connection with the latter project, Dr. Nelson stated that he had been in conference with officials of the district during his visit to southern Oregon and that he anticipated no opposition to reflooding an area which would approximate some 10,000 acres of the lake bed, so far as it would not jeopardize interests of the land owners. This area was designated by President Roosevelt in 1909 as a Migratory Bird Refuge, but in 1917, reclamation development was instigated which drained the entire lake bed. The reflooding, however, would entail the construction of an expensive dyke to protect the lands now in private ownership.

SAFETY SCREEN TO BE INSTALLED AT LAKE ALMANOR.

An agreement has been reached under which the much-discussed water diversion outlet to Lake Almanor will be screened to prevent the escape of fish from that body of water into the tunnel leading to one of the hydro-electric units of the great Western Power Company. This agreement was reached recently at a conference held at offices of the California Fish and Game Commission, in which representatives of the Associated Sportsmen's Clubs of California and officials of the power company were present. It is the belief of the sportsmen, who have labored long in an effort to secure this safeguard for the fish life of Lake Almanor, that the new plan will give satisfactory results and that many fish will be thus saved to spawn and provide splendid bags for those who visit that region.

Lake Almanor is located in Plumas County, about five miles south and west of Westwood, and about sixty-five miles northeast of Chico. It is a favorite fishing ground for many sportsmen who come from all over the state to cast their lures for rainbow and other fish peculiar to that region.

The outlet which will be screened by the power company is known as the Prattville Outlet. The waters passing from the lake at this point pass through a tunnel from three to four miles in length, into Buck Reservoir and finally into the turbines at the Great Western's

Caribou Plant. The dam at the lake is being raised forty-five feet, thus increasing the reservoir to three times its present storage capacity and, according to officials of the company, remedying the muddy condition of the river.

SPOT WHALES BY AIRPLANE.

The whalers of the North Pacific, operating from Vancouver, B. C., are making preparations for a new venture in that industry—the use of sea-planes. Officials are confident that the use of a plane will greatly increase their catch. Looking down from an altitude of 1000 feet, a range of 25 to 50 miles can be obtained, and an airman will be able to pick out the mammals and communicate his find to the fleet by means of signals. This will enable the boats to approach their prey direct and not have to spend time searching for them.—*Catalina Island*, Sept. 22, 1926.

CATS EAT BIRDS.

Recognizing the harm that cats do to our insectivorous and song birds, the Associated Sportsmen's Clubs of California have recently issued a small leaflet entitled "Cats Eat Birds," a replica of which is reproduced here.

Perhaps few people realize the role played by cats as bird destroyers. The cat, as a domesticated animal, seems an innocent and inoffensive creature, but it is not primarily with the well fed house cat that we are concerned. There is a large number of vagrant cats that have neither home nor owner. It is with this class that we have to deal. Left to themselves, it is, at times, hard for them to secure a meal and it is under such conditions that they revert to their primitive habits of preying on birds and small mammals.

The status of the domestic cat has been carefully investigated by E. H. Forbush, of the state board of agriculture of Massachusetts.* His conclusions are very ably set forth in the following quotation:

"The cat is far more widely kept and distributed than any other domestic animal, and is under less control and restraint than any other. It usually has a greater affection for places than for persons, and tends to return to its home when its owner moves away. Also, it readily abandons its owner, and, often abandoned by him, returns to the wild. Incalculable numbers of wild or stray

*Forbush, Edward Howe. The Domestic Cat. The Commonwealth of Massachusetts, State Board of Agriculture, Economic Biology, Bulletin No. 2, 112 pp., 1916.

house cats now roam the woods and fields of New England. These wild cats attract others from their homes.

"Many, remaining with the owners, are fed insufficiently or not at all, and having to rely on their own efforts for food, emulate those that have run wild. Many pet cats are allowed to roam the country at night. People keep too many cats, and as the population increases the number of cats increases accordingly.

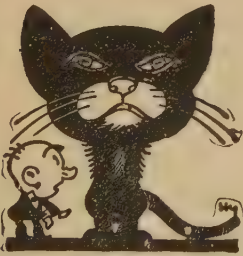
"The cat, an introduced animal, is not needed here outside of buildings. It has disturbed the biological balance and has

seven and one-half million to nine million dollars annually. The cat protects them, thus increasing the cost of living to every citizen. The good that cats accomplish in the destruction of field mice, wood mice and insects is of little consequence beside the ravages that they inflict among insectivorous birds and other insect-eating and mouse-eating creatures.

"There are laws to protect insectivorous birds against gunners, snares and trappers. Birds of prey and wild predatory animals are proscribed by law, and bounties are offered on the heads of some. Many states offer bounties for native wild cats, but there is no law to check the ravages of the wild house cat, a far more numerous animal. A man may be fined \$10 for killing a songbird, but he may keep any number of cats and may train them to kill many birds weekly. Hardly a hand is raised to stay the destruction of valuable wild life by hundreds of thousands of vagabond or wild house cats. Hunters and trappers have little incentive to kill them as the fur is of small value. Legislation is needed to check this evil.

"The claims of the cat to a place in our domestic life rest primarily on the fact that it is supposed to do for us, with little conscious effort on our part, the onerous, petty and disagreeable task of destroying small rodents which for centuries have elected to fasten themselves as parasites on civilization. In so much as the creature fails in this, in so far as it destroys other more useful or nobler forms of life, in such measure it becomes an evil and a pest. It will become an influence for good or ill according as we mould it, restrain it and limit its activities. It is our duty to check, with a firm hand, its undue increase in domestication, and to eliminate the vagrant or feral cat as we would a wolf."

CATS EAT BIRDS!



**SEMI-WILD, EX-HOUSE
CATS ARE BIGGER THAN
MAN IN GAME BIRD CON-
SUMPTION and a menace to
song and insect-eating birds.**

**DO NOT ABANDON CATS
IN THE COUNTRY to prey
upon our already depleted
bird life. GET RID OF
THEM IN SOME OTHER
MANNER—SAVE BIRDS.**

Published in co-operation with the
**ASSOCIATED SPORTSMEN'S
CLUBS OF CALIFORNIA**
In the interest of increasing the wild
bird life of the State.

become a destructive force among native birds and mammals. It is a member of one of the most bloodthirsty and carnivorous families of the mammalia, and makes terrific inroads on weaker creatures. It is particularly destructive to certain insect-eating forms of life, such as birds, moles, shrews, toads, etc. Every year the cats of New England undoubtedly destroy millions of birds and other useful creatures, therefore indirectly aiding the increase of insects which destroy crops and trees. Such insects possibly cost the people of Massachusetts from

THE GOATS OF GUADALUPE ISLAND.

Out in the Pacific on a nearly barren island, goats are learning to climb trees and swim in the ocean for food. Necessity is the teacher of this population of Guadalupe Island, a volcanic bit of dry land sticking up out of the sea 240 miles southwest of San Diego, according to Laurence M. Huey, curator of birds and mammals in the natural history museum at San Diego.

Guadalupe Island, which has become famous during recent years as the only known habitat of the elephant seal, formerly was used as a penal colony by the Mexican government. Today the only

inhabitants are a guard of Mexican soldiers to protect the elephant seals, which have become almost extinct, and myriads of goats.

These goats climb to the highest pinnacle, and thread their dangerous way up the face of the cliffs overhanging the sea in search of a blade of grass or a bit of herbage. During the dry season food is so scarce that the goats have resorted to eating the bark from the cypress trees which crown the island, and desiring the luscious looking foliage they learned to climb the trees. But by constant gnawing away of the bark, the trees are dying, and the goats have had to turn to the sea for their provender. They eat the bits of seaweed that are cast upon the beach and even venture into water for more pretentious forays.

By destroying the cypress forests the goats are destroying their only source of fresh water supply, and unless they learn to subsist upon the hitherto unpalatable salt water, they will die of both thirst and hunger.

The goats, which were first introduced in the penal colony days to supply food and milk for the colonists, have proved the nemesis of other forms of life on the island. Of the ten forms of bird life and mammals that are endemic to Guadalupe, they are responsible for the extinction of three. The towhee and wren were exterminated by the complete destruction of the underbrush, while the carcaras preyed upon the new-born kids and were destroyed by men who had been granted the concession of exploiting the goats for their hides and tallow.

Several carcasses of goats have been seen floating in the water beneath the precipitous cliffs, an evidence that the animals had fallen from the bluffs overhanging the sea. But, as a rule, they cling to the face of the precipices almost as tenaciously as a fly ascending a window-pane.—*Science*, Sept. 24, 1926.

REGULATION OF SHOOTING DEVICES DISCUSSED.

A conference of sportsmen, game officials and conservationists, called by Dr. E. W. Nelson, chief of the Bureau of Biological Survey of the United States Department of Agriculture, was held at the offices of the bureau in Washington during September to discuss the use of sink boxes or batteries, matblinds, and other devices employed in hunting migratory wild fowl in the waters of Maryland, North Carolina and Virginia.

It was desired to obtain information that might be of value in connection with

the administration of the Migratory Bird Treaty Act and the preparation of any necessary regulations under it, in view of the belief of many sportsmen that there is a necessity for better regulation in the use of devices in duck shooting in some parts of the Atlantic Coast States. The situation was thoroughly discussed, and many valuable facts bearing on the matter were brought out looking toward a settled policy as to regulation.

OUR RANCH FOLKS.

Close their gates; be careful where you shoot; ask their permission before hunting or fishing in their fields; don't tear down their fences, or do any other wrong act. If you never go back, some brother sportsman's rights and your sport will be increased and your conscience will feel easier.—*Montana Fish and Game Commission Report, 1923-24.*

NEW BULLETIN ON FUR LAWS ISSUED.

The United States Department of Agriculture has recently issued a new bulletin on fur laws (Farmer's Bulletin No. 1515-F). It points out that all fur animals need proper protection, if their numbers are to be maintained and good fur is to continue to be produced. The value of the annual catch of fur-bearing animals twenty-five years ago was roughly estimated at \$25,000,000. Today it is estimated at more than \$60,000,000, and even this figure would doubtless have been exceeded if the supply had been maintained. Serious students of conservation feel that the fur resources are not being given deserved attention, particularly in the face of this monetary showing.

The principal fur bearers in the United States are the minks, skunks, raccoons, opossums, minks, martens, foxes, otters, fishers, and beavers. The most valuable from the standpoint of financial returns from the annual catch are the four heading this list, although the pelts of some of the others have a higher individual value.

The new bulletin contains a complete summary of all the laws in the various states and Canadian provinces relating to fur animals effective for the present trapping season. Regulations affecting the interstate shipment of pelts are explained, and the legislation enacted during the year is reviewed, with all important changes noted. The information is published to encourage effective action on the part of trappers, fur tradesmen, legislative committees, conservation societies, and others concerned in maintaining the

stocks of fur animals, and thus the fur supply.

The bulletin may be obtained, while the supply lasts, by addressing the United States Department of Agriculture, Washington, D. C.

THE TULE GOOSE.

Until a short time previous to the description of the tule goose which appeared in 1917, it was not generally known that two kinds of white-fronted geese annually repair to the Sacramento Valley of California in winter. Additional notes on this larger and rarer tule goose have recently appeared in *The Condor* (Volume 28, pp. 241-243) under the authorship of James Moffitt. His observations were made at Joyce Island, in the Suisun Marshes of Solano County. Records of this bird from more southerly points are yet to be obtained.

Since some of the points brought out should be of interest to hunters, they are cited here.

1. The tule goose has a much darker shade of brown on the neck and head. Weights run six and seven pounds against four and five pounds for the white-fronted goose.

2. It frequents the heavily wooded banks of the larger sloughs and the ponds in the midst of heavy tule growth. They do not seem to leave this area for stubble fields as do the white-fronted geese.

3. In flight, the larger bird has slower, more measured wing beats. They fly closer to the ground, seldom attaining an elevation of more than 200 feet.

4. Flocks of tule geese are composed of fewer individuals than those of the white-fronted geese, six to eight birds of the former as against twelve of the latter are the rule.

5. The voice of the tule goose is noticeably harsher and coarser than that of the white-fronted goose.

HORNS AND ANTLERS.

Although it is customary for the average hunter to speak of the horns of a deer, yet proper usage would require the term "antlers." According to the *Ranger Naturalists' Manual of Yellowstone National Park*, reference to Webster's Dictionary shows that horns are "processes born on the heads of many hoofed mammals and used chiefly as weapons of offense or defense. . . . They consist in a horny sheath of epidermal substance supported by a bony core. Whereas "antlers" differ in being solid, generally branched, bony outgrowths shed and renewed annually.

In other words, horns are in a way comparable with finger nails or hair and hoofs—modifications of the skin. Whereas antlers are composed of bone and are modifications of the skeleton.

"The antlered animals, elk, deer and moose, shed their horns in the very early spring or late winter—in February or March usually, and immediately thereafter the new ones start to grow. During the time that the horns are growing they are soft and spongy and are covered with a thick layer of skin, and the whole structure is richly supplied with blood vessels and nerves. The blood is the building agent and the nerves keep the growing horns very tender so that the animal will not use them nor even touch them against anything hard if he can avoid it. Thus they are carefully protected against injury while they are still soft. The horns are fully grown in late August or September but the protecting skin does not usually start to dry up and peel off until the last part of the month of September. Then the animals rub them against trees and bushes, stripping off the dead skin and leaving the new, sharp antler fully grown, ready for the fighting season.

"All American horned animals have hoofs, but all hoofed animals do not have horns. We immediately think of the horse and the pig. All of the native hoofed mammals in Yellowstone National Park are ruminants, chewing the cud."

CHIEF OF PATROL ATTENDS EASTERN CONVENTION.

Mr. J. S. Hunter, chief of patrol, represented the California Fish and Game Commission at the meeting of the International Association of Game and Fish Conservation Commissioners and the American Fishery Society meetings held at Mobile, Alabama, September 20 to 24. He reported that many interesting papers were read and that the discussions were very much worth while.

The argument on the Federal Game Refuge and Public Shooting Ground Bill showed that most opposition comes from the middle west. The active opponents were representatives from Kansas, Oklahoma and Texas. Kansas objected to it because they wished to avoid government interference in game conservation. The representative from Texas called attention to the fact that a few years ago there were only four violations for which a man could be prosecuted in the federal courts, now, he stated, there are sixty-four. Notwithstanding these ob-

jections, the convention passed a resolution strongly endorsing the federal bill.

Before adjournment, the association adopted a resolution vigorously protesting against the unjust and unreasonable provisions of the National Tariff Act which requires the payment of a duty on game birds imported for stocking purposes by state game commissioners. The officers of the association were empowered and directed to use all proper means through the President of the United States, the United States Tariff Commission, and Congress to secure such modification of the act as will permit the importation of game birds for stocking purposes free of charge. It was also directed that every effort be made to secure a refund of such sums as have been paid to the government in duties by the various state game departments.

Sessions of the American Fisheries Society were poorly attended on account of a storm.

CANADIAN REGULATIONS REGARDING SANCTUARIES.

Following are some of the essential regulations for the control of bird sanctuaries in the Dominion of Canada:

Bird sanctuaries shall be under the control and management of the Commissioner of Dominion Parks. Private use of these sanctuaries is prohibited except under special permission or lease granted prior to the date of the creation of the sanctuary.

Within a sanctuary, the killing, capturing, taking, injuring or molesting of migratory game, migratory insectivorous or migratory non-game birds, or the molestation of their eggs or nest is prohibited, with this exception, that the shooting of wild ducks and wild geese may be allowed in any year under permit from the Commissioner of Dominion Parks, in such portions of a bird sanctuary and during such time as the minister from time to time shall decide.

Within a sanctuary, the carrying or possession of firearms and decoys is prohibited unless special permission is granted by the commissioner.

Cats and dogs found upon a bird sanctuary may be destroyed by any game officer. Sporting dogs, however, may be brought upon a sanctuary or any portion thereof where shooting of ducks and geese is allowed during the open season.

NEW FISH PLANTING FILM SECURED.

A splendid new film, depicting the proper method of planting young fish in streams of the state, was recently donated

to the commission by Pathe. It shows the method of icing and aerating the cans, and of transporting by pack train and by man. It is at times necessary to transport these cans of trout on the backs of men, using a special harness for the purpose, for certain types of rugged, boulder-strewn country are inaccessible to mules.

This film will be used during the winter months by the Bureau of Education and Research, in illustrated lectures before leading sportsmen's clubs, nature study clubs and high school student bodies throughout the state.

Prior to fish planting time next season, it is proposed to show the film before each group handling the fish planting in various sections of the state. Next year's plantings are all to be made under the direct supervision of trained employees of the Commission, assisted by volunteer planting crews from the various sportsmen's clubs.

OCEAN INDUSTRIES VS. CALIFORNIA FISH AND GAME COMMISSION.

During the month of October, the concrete ship *Peralta* was towed from San Francisco to Monterey Bay. The vessel is equipped as a floating fish-reduction plant, and is owned by The Ocean Industries Company, a Nevada corporation.

This concern is seeking to evade the laws by disputing the interpretation of the three-mile limit. Accordingly, the *Peralta* was moored within Monterey Bay, but at a distance of three miles from any point of land. Here she commenced to reduce to chicken feed and fertilizer the immense hauls of fish brought to her by the purse seine boats.

The Fish and Game Commission secured from the superior court of Santa Cruz County a temporary restraining order preventing the Ocean Industries Company from operating. On October 18, Mr. Greene, at the head of a large force of deputies, seized two of the purse seine boats, and nets valued at nearly \$8,000. The Ocean Industries then sought a temporary writ in the federal courts restraining the Fish and Game Commission from interfering and for \$10,000 damages, plus \$1,000 a day for each day that the *Peralta* was idle. On October 23, Judge A. F. St. Sure ruled in this case that all of Monterey Bay was within the jurisdiction of the state and later dismissed the suit for damages. On October 28, the decision was reaffirmed by Superior Judge H. F. Lucas. On November 16, the final hearing was staged in the Supreme Court at Sacramento,

upon a petition by the Nevada corporation to prevent the superior court of Santa Cruz County from enforcing its injunction, but up to date the verdict is still pending. Despite rumors to the contrary, the *Peralta* is not operating, and can not do so unless a decision is rendered in her favor. This seems extremely unlikely, in view of the fact that every court thus far has supported the Fish and Game Commission.

This case is of extreme importance, because, should the Ocean Industries win it the wholesale and indiscriminate destruction of fish off the California coast would cripple, if not ruin, the fish packing industry. The leading fish cannery realize this, and they are therefore giving their whole-hearted support to the Fish and Game Commission in its attempt to establish the limit three miles beyond a line joining the headlines of any bay.

REINDEER INDUSTRY IN ALASKA.

The Bureau of Biological Survey has recently issued a pamphlet entitled "Progress of Reindeer Grazing Investigations in Alaska," by Lawrence J. Palmer (U. S. Dept. of Agriculture, Dept. Bull. No. 1423). Some of the more interesting items are quoted below:

"The stock of 1280 reindeer imported from Siberia into Alaska between the years 1892 and 1902 has increased to approximately 350,000, not including about 125,000 utilized for food and clothing. The annual gross increase in herds is between 33 and 45 per cent. About a third of the Alaskan reindeer are now under white and two-thirds under Eskimo ownership in individual and company herds. One incorporated company owns about 50,000 reindeer in six herds.

"In the two years 1924 and 1925 reindeer meat weighing more than 1,000,000 pounds was exported from Alaska, and a steady increase in the output and in the demand for it is indicated. The meat is fine-grained, compares favorably with beef, and when fresh is exceptionally juicy and tender.

"A rapidly growing industry requires that scientific studies be made for its best development, and under congressional authorization such studies were begun by the department in 1920 through the Biological Survey. Improved methods have been recommended to herd owners for handling reindeer and utilizing the range, and investigations on these lines are being continued, with the reindeer experiment station of the Biological Survey at Fairbanks as a center. A study of range units is being made with the view to inaugurat-

ing a permit system of grazing allotments. Careful and continuous inspection will be required to determine whether an area is being under or over grazed.

"Of the two types of reindeer in Alaskan herds, the long, rangy type is usually heavier and better for meat production. The dressed weight of a carcass averages 150 pounds, with 300 pounds as the maximum. Experiments in the development of a heavier type are being conducted on Nunivank Island through crossbreeding with caribou bulls captured in the interior of Alaska and transported to the island for the purpose.

"The use of sled reindeer is recommended for herd management and other transportation uses, and studies have been made in breaking and training the animals and in feeding them on other than a lichen diet.

"Reindeer have been successfully fed grain and hay with other cultivated crops, and lichens are found not to be essential to their maintenance. As a ready source of food, lichens will continue to be the chief sustenance of the herds, however, and are what make reindeer grazing possible in Alaska. Studies will be continued to determine the effect of a varied diet on meat quality.

"Grazing in Alaska is tending toward permanent ranches with natural boundaries, each grazing unit having its own summer and winter ranges. Under a fixed-allotment system open herding is found more practicable than the close herding introduced by the Lapps.

"Winter grazing requires a greater acreage per head than summer. Year long, from 40 to 60 acres for one reindeer is indicated—10 or 15 for summer and 30 to 45 for winter grazing. About Norton Sound the acreage per animal is 40 to 45, and farther north, 50 to 60. These figures furnish a basis for determining the future carrying capacity of definitely marked areas. The areas available to grazing in Alaska should ultimately support 3,000,000 reindeer, a third of this number on the coast section now occupied.

"Full progress in the reindeer industry can come only from the adoption of better management methods, not only in range control and regulation but in herd management and provisions for transporting and marketing the meat. This involves open herding, reduction of the proportion of bulls in the herds, selection of the best stock for breeding, infusion of new blood by transferring bulls and cross breeding with native caribou, adoption of improved methods of corralling, branding, and cas-

tration, keeping sled reindeer in each herd, and providing for herd ownership on the percentage basis for increases, with one registered brand for a community herd, and for cold-storage facilities to assist in marketing."

FEWER FISH IN GREAT LAKES.

More than 100,000,000 pounds of fish have been taken yearly from the Great Lakes for the last fifty years, the Bureau of Fisheries tells "Capper's Weekly." The high point was in 1922, when the yield was 140,000,000 pounds, valued at \$9,000,000. Lake Erie, second smallest of the Great Lakes, produces about half the fish yield of all the Great Lakes combined. In 1922 the catch of Lake Erie amounted to 54,000,000 pounds, but the latest reports from Lake Erie indicate production has fallen greatly. The pollution of the water of the lake, which is virtually unrestricted, and intensive fishing, are believed to be partly to blame.—*New York State Fish, Game and Forest League.*

PRESIDENT INCREASES AREA OF WILD LIFE RESERVATION.

By Executive order of October 2, 1926, President Coolidge authorized the reservation of several tracts of marsh and overflow public lands, to be included in the Upper Mississippi River Wild Life and Fish Refuge, administered by the Bureau of Biological Survey in cooperation with the Bureau of Fisheries. The new refuge was authorized by Congress two years ago, to extend along both sides of the Mississippi River from Rock Island, Ill., to Wabasha, Minn., a distance of approximately 300 miles, and about one year ago the President by Executive order included in it all islands owned by the United States within the limits of the reservation but formerly withheld from public entry for the use of the War department in connection with possible improvements of navigation on the upper Mississippi. The new order adds approximately 960 acres to the refuge, among which are a number of small islands and overflow areas along the mainland on either side of the river. The tracts in the State of Illinois comprise 224 acres; in Iowa, 321 acres; in Minnesota, 146 acres; and in Wisconsin, 268 acres. The issuance of the Executive order of October 2 was on recommendation of Secretaries Work and Jardine. Additional overflow areas suitable for the birds and other wild life on the refuge are being surveyed and acquired by gift and pur-

chase through the office of the Biological Survey at Winona, Minn., in charge of W. T. Cox, superintendent of the refuge.

FEDERAL AND STATE GOVERNMENTS COOPERATE TO ENFORCE GAME LAWS.

The recently published directory, compiled in the Biological Survey, United States Department of Agriculture, of officials and organizations concerned with the protection of birds and game (Department Circular No. 398-C), shows the character of the many groups interested in the conservation of wild life. The protection of game animals and birds, fur animals, and fish is seen to be backed by the federal government, by state governments, and by international, national, state, and local organizations, and is encouraged by Audubon Societies and other nature clubs. So numerous are these that purely local organizations are omitted from the directory, and only those are listed that are of state-wide scope or larger. These number 210, of which 70 are governmental agencies, 19 are international, national, or Canadian organizations, and 121 are state or provincial associations, including Audubon societies and state divisions of the Izaak Walton League of America.

Whereas the functions of all have to do with the encouragement of wild life conservation in an educational or other way, actual enforcement of game, fur, and fish laws is in the hands of federal or state governmental agencies. The publication of the coordinated lists of the officials and organizations is only one form of cooperation on the part of the federal government. In the enforcement of the game and fur laws there is also cooperation of such direct nature as to give concern to violators and others not inclined to observe the laws. Two concrete examples will demonstrate how the federal and state governments are co-operating, one showing how a state is assisting in the enforcement of federal game regulations and the other how the United States game wardens employed by the Biological Survey aid the various states in apprehending violators of their game and fur laws.

STATE COOPERATION

Recent Federal regulations under the migratory-bird treaty act made the opening date of the season on wild ducks in California October 16, and thus rendered ineffective the provisions of the state law that would have opened the season on

October 1. Under the same regulations the season might continue until January 31, except for the fact that the California law now in force would be violated by hunting after January 15. Both the state law and the federal regulations contemplated a season of $3\frac{1}{2}$ months, but the 4 months maximum extent under the conflicting dates is actually shortened to 3 months, the federal regulations cutting off the first half of October allowed by the state, and the state law lopping off the last half of January provided by the federal regulations.

To help enforce the federal regulations, the California Fish and Game Commission not only gave wide publicity to the deferred opening date but at the same time served warning that the provisions of the regulations adopted by the Secretary of Agriculture and promulgated by the President would be rigidly enforced by all its state wardens, who were instructed to cooperate with the United States wardens to this end. The only hope that California's sportsmen have of enjoying a full waterfowl season of $3\frac{1}{2}$ months lies in the possibility that the state legislature, when it meets in January, 1927, may act on a proposed measure to add two weeks to the end of the season to make it conform with the season allowed under the federal regulations.

FEDERAL COOPERATION

The federal government in turn can

give assistance to state authorities through the fact that United States game wardens, in the course of their activities in the enforcement of the migratory bird and other federal game laws, constantly encounter violations of state laws. Each of these wardens is thus in position to render substantial cooperation to state authorities in the enforcement of their game, fish, and fur legislation. Examination by United States game wardens of the records of raw-fur receiving houses has proved a fertile field of cooperation, and thousands of reports of apparent violations of state laws protecting fur animals and regulating the shipment of pelts are annually referred by federal wardens to state game authorities for investigation. In many instances it is necessary to follow up these reports and still further aid the state in prosecutions by obtaining consignee affidavits covering the receipt of shipments and the original canceled checks for payment, and in many cases the original correspondence between the shipper and the consignee. There is a good percentage of state convictions based on this information, and the value of this federal service is being more and more appreciated by the various state game departments. For the past few years penalties and forfeitures accruing to the states as a result of information furnished by United States wardens have amounted to from \$20,000 to \$25,000 annually.

FACTS OF CURRENT INTEREST.

Whereas tagging experiments are showing that salmon from the entire Pacific Coast migrate to the waters of British Columbia to find feeding grounds, similar experiments with halibut off the coast of Washington are showing that halibut are restricted to small areas. In one instance, 70 per cent of tagged halibut have been retaken on the same bank.



Favorable reports on valley quail have been received from all parts of the state. Quail have been appearing in great abundance in many of their former haunts, apparently due to a couple of good breeding seasons.



The catch of salmon has been decreasing steadily. That the future of king salmon in California waters is threatened is the decision of experts.



Albacore have again been caught in sufficient numbers in the Monterey Bay district to furnish local markets with fresh fish of this variety.



A number of changes in game laws have been proposed by the Fish and Game Study Committee of the California Development Association. Discussion of the report of this committee received first place on the program of the California Sportsmen's Convention held at the Hotel Whitcomb, San Francisco, December 9-10, 1926.



The splendid cooperation of judges in the enforcement of fish and game laws continues. Fines are such as to deter the habitual violator and warn those who are ready to commit minor violations.



A crystallized sentiment favoring better protection for the Pismo clam is now evident.



The twenty-ninth biennial report of the California Fish and Game Commission, which details the work and accomplishments of the last two fiscal years, is off the press and is available at your public library or on written application to the Commission.



The total distribution of trout for the past two seasons amounted to 59,524,700; of salmon, 14,157,150.

COMMISSION ACTIVITIES.

Department of Fish Culture.

Spawning of salmon at the Klamathon Egg-Taking Station began on October 17th. By the end of that month, over 5,000,000 eggs had been secured. Part of the take was sent to the Fall Creek Hatchery and the remainder to the Mount Shasta Hatchery.

Continued attempts are being made to keep the Klamath River well stocked with young trout in order to compensate for the concentrated fishing of the past few years. Last fall, 50,000 rainbow trout were planted above the Copco Dam and 150,000 in tributaries of the Klamath.

Attempts were made last fall to secure eastern brook trout eggs at Gull Lake. Resort to a seining method was necessary. An additional stock of eggs of the eastern brook are badly needed since brook trout at the Mount Shasta Hatchery have shown signs of weakness in the past year.

Elsinore Lake, in Riverside County, received a shipment of 3000 blue-gilled sunfish and 500 crappie. Since the water of this lake is brackish, the plant may not be successful. If it is not successful Superintendent of Fish Culture Shebley suggests the planting of the orange sunfish, a fish which can withstand considerable alkalinity.

Clear Lake, in Lake County, has received a new stock of catfish. This time a plant of 4000 forked-tail, or channel, catfish was made.

Biologist Coleman has continued a biological survey of Mono Lake. Particular attention is being paid to the natural food and the possibility of improving the food supply. A knowledge of the food present in the lake, or stream, may well determine the kind of fish adapted for each place.

A shipment of Ayu eggs from Japan, the third shipment made, arrived November 1st. Unfortunately the shipment was so badly infested with fungus that none were hatched, though every effort was made to save the eggs.

The salmon run on the Klamath River was greatly hindered by a sand-bar which formed at the mouth of the river. Interested persons attempted to keep the channel open, but this was accomplished with difficulty. During October the Klamathon Spawning Station reported but one-half the number of salmon in the racks as compared with last year.

One observer on the Klamath reported a count of 316 anglers on a stretch of 20 miles near Hornbrook. With such concentrated fishing, it would appear that maintenance of the splendid runs of fish would be increasingly difficult.



FIG. 9. Young ring-necked pheasants at Yountville Game Farm awaiting distribution. Photograph by H. C. Bryant. September, 1926.

Department of Patrol.

Never in the history of game legislation in the State of California has the Fish and Game Commission received such splendid support from the judges. Some of the most interesting cases of the last two months, recorded below, give evidence of this changed attitude.

Arrest by Deputy Post, fine \$100, violation 2 quail.

Arrest by Deputy Post, fine \$250, violation doe.

Arrest by Deputy Sellmer, fine \$100 and 60 days, violation fawn.

Arrest by Deputy Holmes, fine \$300, violation pumping oil in Noyo River.

Arrest by Deputy Carpenter, fine \$100, violation 52 ducks.

Arrests by Deputies Lencioni and Von Arr, 90 days each, violation trapping quail and honker goose.

Twenty-seven arrests for breaking deer law, nineteen for not having a hunting license, sixteen for shooting quail out of season, and eighteen for shooting or trapping non-game birds were made in October.

During the month of October, 3000 fishing licenses were checked by deputies of the Commission. A large number of seizures were also credited to this month. The 194 dollar-a-year deputies made ten good cases besides accomplishing other excellent work. During September, 204 arrests were made, the total in fines aggregating \$7,909.

Deputy A. Bullard brought a violator into court for killing at night. The judge considered both counts and fined the violator \$400.

Judge John M. Hoesch, of Morgan Hill, has supported Deputy C. E. Holladay in efforts to clean up the situation in Santa Clara County. During September, three men apprehended with two ducks, three cottontails and one blue heron, paid a total fine of \$200 when arraigned before the judge. During October, one violator, with deer meat in his possession, paid \$125. Non-game birds cost two other violators a relatively great sum, for one caught with five robins paid \$100 in fine, and another caught with six robins paid \$150.

On information from Captain Allred, of Humboldt County, a car containing

crabs was stopped at Willits by Deputy Hellard. The man arrested was awarded \$180 or 180 days in jail.

One of the finest instances of a judge's cooperation in fish and game protection was pointed out recently at Willows, where Justice L. P. Farnham assessed a jail sentence of 210 days against a professional duck hunter found in possession of forty-eight ducks. This man has been taken three times previously and fined in Colusa County courts. The fines appeared to have no effect. Judge Farnham felt that a jail sentence would give the violator time to ponder his error. Accordingly, the judge imposed a sentence of fifty days for exceeding the bag limit; seventy days for using an unlawful gun, and an additional ninety days for shooting at night, making a total of 210 days. At any rate, the duck season will close before he is released and the ducks will be safe from this exterminator. Wardens Bruce L. Hammock, of Potter Valley, and George Thompson, of Gridley, made the arrest. Credit is also due to Patrol Captain S. J. Carpenter, who skillfully engineered the case.

Justice Hermann Rudolf, of Novato, recently assessed a limit fine against four violators brought in by Warden Walter B. Sellmer. These men all gave San Francisco as their addresses. When taken they had numerous quail out of season and non-game birds. "They killed everything from a hummingbird to a quail," said Sellmer. Judge Rudolf assessed a fine of \$600.

Justice John A. Ellis, of Geyserville, assessed a fine of \$100 for killing wild pigeons to a violator brought in by Warden J. H. Groves, of Cloverdale, assisted by Patrol Captain Henry Lencioni, of Santa Rosa.

Judge George B. Reckers, of Williams, gave the option of "100 or 100 days in jail" to two men charged with night hunting by Wardens J. V. Shearin, of Stonyford, and L. W. Dinsdale, of Woodland. Both went to jail. Score another for the ducks.

On September 27th, Walter R. Welch, of Stockton, California, was appointed as special field assistant to have charge of the organization and education of dollar-a-year wardens. Mr. Welch made such a success in organizing the wardens work-

ing under the San Joaquin Fish and Game Protective Association, and under Deputy Jack O'Connell, that he was chosen to head this important work. Since these dollar-a-year men only devote a portion of their time to law enforcement, it is all the more necessary that they be well trained in order that their service may be the most effective. Mr. Welch will endeavor to instruct dollar-a-year wardens so that they may conduct themselves in such a manner as to command the confidence and respect of the people and bring credit to themselves and those responsible for their appointment.

turned over to the Hooper Foundation of the University of California. Under the direction of Dr. K. F. Meyer, several scientists will be employed to solve important problems bearing on the canning industry.

During November, a large number of cannerymen gathered at a banquet to celebrate the opening of the laboratory in which the work will be done.

During September an analysis of the albacore boat catch was made. In attacking this problem, new methods in fishery research were employed which constituted



FIG. 10. A special pheasant food from Asia called proso is being grown at the Yountville Game Farm. This is considered one of the best natural foods yet found for the ring-necked pheasant. Photograph by H. C. Bryant.

From all parts of the state have come reports of the excellent work of the dollar-a-year wardens, particularly in those cases where they have worked in conjunction with, and under the direction of, regular wardens.

Department of Commercial Fisheries.

At the suggestion of cannerymen, the Fish and Game Commission has appropriated \$15,000 to finance investigations relative to the canning of fish. This sum has been

an original contribution. This analysis will be included in the forthcoming report on the albacore.

During the past summer, further statistics were gathered on the catches of rock cod. It will be remembered that attention has been given the rock cod fishery because of signs of depletion. The main interest continues to center on the albacore and sardine. However, a few side investigations, that have timely importance, are being undertaken. In this connection some new men have been detailed for work on the barracuda. The work will include a careful search of liter-

ature together with study of the catch and the microscopic study of scales to determine age and rate of growth.

Bureau of Publicity.

The number of newspapers that print the publicity items issued by this bureau continues to increase. During the month of October, twenty-two stories, many of them relating to water pollution, pheasant planting, and to change in game laws were issued. Dependable information on the work of the Commission is now reaching the residents in the mountain districts, as well as those in cosmopolitan centers.

of the southern California district, and Game Warden Frank Dunne, set at liberty more than 250 birds, all of them over five months old. A beautiful setting in green alfalfa fields along the Santa Ynez River had been chosen for the future home of the birds, upon which there is a closed season until such time as the state legislature sees fit to declare the birds prevalent in sufficient numbers to warrant a short shooting season and limited bag.

More than 75 residents of Santa Barbara County, drawn from every section of the region, were in attendance to welcome the birds and witness the liberation.

Other liberations were made on the Cooley ranch, near Colton in San Ber-



FIG. 11. Trout jumping in pool at Beaver Creek Egg Collecting Station. At this station one of the new self-operating traps with concrete piers has been installed. Photograph by Lawrence A. Perry. April, 1926.

Bureau of Game Farms.

Planting of pheasants in southern California continued during the month of October. Shipments totaling 1200 birds were sent south and plants were made in Bakersfield, Santa Barbara, Colton, Temecula, Chino and El Centro. A shipment is still being held for planting near Fresno.

One of the most interesting liberations was at Solvang, near Santa Ynez Mission, on Saturday, October 16th. Here E. H. Lewis of the California State Game Farm, assisted by officials and members of the Santa Barbara County Sportsmen's Club, Patrol Captain C. S. Bauder

nardino County. Both locations were pronounced excellent by Mr. Lewis.

Commissioner Ralph H. Clock, of Long Beach, attended some of the game bird plantings and urged local sportsmen to protect them until such time as they had established themselves and their kind in quantities. At Solvang, the local justice of the peace declared that any violator of the law, governing taking of pheasants brought before him would be given the maximum penalty.

Considering the late start, the output from the State Game Farm during the past season was remarkable. About 4000 pheasants were successfully reared and planted in various parts of the state. A

breeding stock of about 400 hens and 100 cocks will be held for next season's operations. This breeding stock will provide about 25,000 eggs and it is hoped to approach the 15,000 mark with young birds.

The pheasants liberated from the game farm along the Napa River in the vicinity of Yountville appear to be thriving. Birds are seen regularly and some of them have moved as far as two and one-half miles up the river.

Bureau of Statistics and Game Problems.

Concerning itself with the mass of statistical data necessary for a proper

ducted by the Commission, provided the necessary assistance was given him. Creation of the new bureau was the result.

Its activities have been outlined as follows:

1. To prepare all statistical data for the patrol department.
2. To take charge of all game breeders' licenses and activities.
3. To investigate all animal and bird diseases in the State of California.
4. To cooperate with the Hooper Foundation of the University of California where the bacteriological and physiological investigation work will be done.

Mr. Irvine will continue to handle bacteriological and chemical analyses for the Bureau of River and Harbor Pollution.



FIG. 12. Bar at the mouth of the Klamath River. Last year the river was exceedingly low. Photograph by Ruth K. Roberts.

study of game conditions in California, and of the diseases affecting wild life of the state, the California Fish and Game Commission announced in October the creation of a new bureau to be known as the Bureau of Statistics and Game Problems. Roy E. Ludlum, for many years an employee of the Commission, an expert statistician and student of game diseases, has been placed at its head. Robert J. Irvine, graduate chemist and bacteriologist and formerly with the Bureau of River and Harbor Pollution, has been transferred to the new bureau. Mr. Irvine's activities will be along research lines, directed by Dr. Karl F. Meyer, of the Hooper Foundation of the University of California. Dr. Meyer recently agreed to supervise personally all research work of this character con-

Progress is being made on the study of bird diseases, which, it will be remembered, is under the charge of Dr. K. F. Meyer, of the Hooper Foundation of the University of California. A number of specimens of sick ducks from Tule Lake have been examined, and in addition a careful study has been made on normal ducks in order that pathological conditions may more readily be recognized.

In addition to studies of duck disease, attention is being given the birds at the game farm. Several live pheasants have been shipped to the laboratory and blood serums and other bacteriological tests are being made on these healthy birds so as to know these birds in both health and disease. Post mortems of all birds which die at the game farm are being made. Under such favorable auspices,

worthwhile results in the prevention of bird and mammal diseases are to be expected.

Bureau of Screens and Ladders.

An outstanding accomplishment is the clearing up of a difficult situation that has existed on the Sacramento River near Redding, owing to the inability of salmon to pass beyond the dam of the Anderson Cottonwood Irrigation District. The matter has finally been adjusted and all sportsmen and conservationists will be glad to hear that a fishway built on correct principles is actually being installed.

Several others are being repaired and several new installations are being made.

A large map mounted in the offices of the Bureau of Screens and Ladders now shows all of the more important installations made by the Bureau.

Engineer Spencer inspected the much advertised Baker Dam "lift" in Washington during November and attended the meeting of the International Pacific Salmon Investigation Federation, at Seattle. Mechanical difficulties connected with proposed lifts to replace fishways over high dams are easily surmounted as compared with the biological problems involved.



FIG. 13. A 38-pound striped bass, 48 inches in length, caught by John Gerber on the Sacramento River, near Sacramento, season of 1926. It took 45 minutes to land this fish. Photograph by John Gerber.

It is hoped that with the completion of this fishway, salmon will again appear in numbers at the spawning station of the United States Bureau of Fisheries located at Baird, Shasta County.

Reports were at hand on December 15, 1926, that fifty-nine screens were in successful operation. Every installed screen will be inspected as soon as possible and records made as to its effectiveness. Similarly, every ditch reported as needing a screen will be inspected and the proper installation recommended.

On the same date forty-three fishways were reported as operating successfully.

Some difficulty has been experienced in the past in securing data relative to new diversions of water. Since all diversions of water from streams in California are of importance because of the necessity of screening ditches and building fishways over dams, such information is necessary. The future, however, looks bright in this respect for the Division of Water Rights has promised to furnish the Bureau of Screens and Ladders, a copy of all applications for the appropriation of water. This will afford an opportunity to furnish every applicant with a statement pointing out the necessity for complying with the laws relative to screens and ladders.

Bureau of Pollution.

Numerous reports received relative to pollution have been followed up by the bureau. In some cases, as for instance, with a wrecked ship off the north coast, it was found impossible to do anything in that the damage had already been done. Many other cases were amicably settled by taking the matter to officials of the company concerned. Since the establishment of this bureau, more active work on cleaning up bad situations has been done than for several years previous. Now that people find that there is a bureau

lution laws is planned. Many streams flow through two or more states and without uniform laws, enforcement is difficult.

The results of many chemical analyses are now on file in the office as a permanent record. These are helpful in new problems.

The first case for the disregarding of section 635 California Penal Code relating to pollution of rivers and harbors of the state by oil and other effluent "deleterious to fish, plant and bird life," was filed on November 8th in the superior court of Los Angeles County. The defendants



FIG. 14. Assistant superintendent Lewis, of the Yountville Game Farm, with male silver pheasant, one of the show birds of the farm. Photograph by H. C. Bryant. September, 1926.

that can be depended upon to go into the matter and make proper adjustments, two things are evident. First, conservationists are keeping the Commission informed regarding bad cases of pollution, and second, companies, of their own accord, are using every means to prevent serious pollution of harbors and streams.

Beginning with November 1, 1926, Mr. John Spencer, hydraulic engineer, assumed charge of the Bureau of Pollution.

Cooperation with other Pacific Coast states looking toward uniform anti-pol-

are seventeen of the leading oil producers of the Signal Hill field. The Commission is seeking an injunction to prevent those companies from operating their wells, skimming stations or dehydrating plants until such time as they have stopped placing waste water, heavily polluted with oil, in natural waterways, from whence it passes into Long Beach harbor.

These actions are the result of a long investigation instituted in September by Major Rolin G. Watkins. In this investigation Major Watkins was assisted by city officials of Long Beach and members of the Long Beach Police, Health and

Engineering departments. During the course of this investigation it was disclosed that fish were being killed by the oil discharged from the seat of drilling and pumping operations on Signal Hill,

and that it was impossible for fish to live in the natural waterways carrying the oil polluted waters into the harbor. Cases of fatal effects upon bird life were also disclosed by the investigation.

LIFE HISTORY NOTES.

STATUS OF THE GOLDEN EAGLE IN SOUTHERN CALIFORNIA.

I note with interest the report of Mr. W. C. Hanna,* of Colton, in regard to the status of the golden eagle, *Aquila chrysaetos*, in southern California, and wish to record my observations on this bird for the last ten years here in the south.

I have had up to twenty-five pairs under observation during this time. I have not located the nests in anywhere near all cases but the birds have been seen in the same general localities from year to year and no doubt nested there in nearly, if not all, cases. There are only three pairs that have been missing these last few years—one near the coast where the land has been cut up into city lots right up to their nesting cliff; naturally, in this instance the birds had to go, and whether they have moved back into the hills to another nest or whether they have passed out of the picture altogether, that I have no way of knowing. However, it is a well known fact that each pair of golden eagles usually has several nests and that they are apt to use them in rotation from year to year. The other two pairs had their nests upon cliffs in the desert, far from human habitation, and I think that their leaving the locality was due to the unusual drouth of these last few seasons, which caused a shortage of their natural food, that would be none too plentiful even under the most favorable conditions. Neither of these two pairs were ever robbed of their eggs or young, as far as I know, and one pair raised young the last year it was there. It will be interesting to see whether they will return to the old nesting sites during seasons of heavy rainfall.

It surely is a fact, as Mr. Hanna states, that the trappers catch a large number of these birds every year, and certainly something should be done, if possible, to stop this unnecessary waste of so fine a bird. I have talked with many trappers and each tells me the same story: some turn the birds loose and others simply kill them, especially if they are seriously crippled. One fine female was brought to me last spring that had been badly hurt in a trap.

There is another condition that is not too satisfactory. Hunters in general (perhaps I am too pessimistic) shoot everything that moves, and seem to think that they have a right to do so, with the result that the American osprey, white-tailed kite, and many other of our large, less wary, beneficial and beautiful species are on the way to oblivion as far as we are concerned. However, be that as it may, I must still maintain that considering the enormous numbers of hunters afield and the natural encroachment of civilization upon their nesting grounds, that the golden eagle is holding its own far better than is perhaps to be expected here in southern California.—Wright M. Pierce, Claremont, California.

BRINGING BACK THE QUAIL.

About ten years ago I bought a ranch in the hills west of Crows Landing. This ranch in former years was a great quail country and carried large coveys of them. Nearly all had been shot before I bought the ranch, there being not more than two or three dozen left. They were hunted off and on and had no chance to increase until about four years ago. At that time I posted the place and explained to the people who had been hunting there that my object in stopping hunting was to see if I could bring back the quail. There has been very little hunting since and the sportsmen are with me in my experiment.

There was a very noticeable increase in the quail each year. Two years ago I put in some new stock that had been caught along the Tuolumne River, nine females and three males. Since then there has been a noticeable increase. It has been estimated by people who have seen them this fall that there are twelve or fifteen hundred birds. Another thing I have noticed is that there are several large coveys of quail on adjoining lands that were barren a couple of years ago. I have no doubt as to where they came from.

In regard to predatory birds and animals, there are a few hawks, plenty of bluejays, some coons, skunks and coyotes. Formerly there were foxes and wildcats, but I have not seen any for some time.

*Hanna, Wilson C., Destruction of Golden Eagle in California. CALIFORNIA FISH AND GAME, Vol. 12, No. 3, p. 153, September 1, 1926.

There have not been any of these predatory birds or animals killed in several years to my knowledge. Also we have had several partly dry years which were not favorable to quail, as they do not pair off in extremely dry years and only partly in the short years.

Restrict the man with the gun, and the quail will come back.—J. E. Newsome, Newman, California.

A MEAT EATING TROUT.

In August, 1926, while fishing on Hollow Tree Creek, Mendocino County, I landed a large rainbow trout. Being interested in the food of trout, I opened the stomach and was surprised to find in addition to remains of crayfish, a sizeable salamander. This salamander was not the typical, reddish "water dog," but was apparently a marbled salamander.—E. H. Kocher, San Jose, California.

PILOT FISH.

A *Naucrates ductor* or pilot fish was caught out of San Diego by a fishing boat, fishing for Van Camp's Cannery, on August 13, 1926. One specimen was brought in, but the fisherman, captain on the *Balboa*, reported he had seen a small school of them. This can not be substantiated, as no more have been caught or seen. This fish is closely related to the yellowtail, but very uncommon. It is reported by Edwin C. Starks that it has only been caught once or twice on our coast. The pilot fish has about five broad dark bars extending from the back to the lower part of the body.—S. S. Whitehead, San Diego, California.

THE MOUNTAIN SHEEP IN THE SAN JACINTO REGION.

The present rarity of the mountain sheep, of the subspecies *Ovis canadensis nelsoni*, makes it of interest to conservationists and to laymen in biology to put on record any information that may come to hand regarding this splendid animal. There are rather indefinite reports from time to time concerning its presence in the broken country east of the San Jacinto Mountains in southern California. These rumors undoubtedly have good foundation, and yet they are mere rumors and not definite records. It was, therefore, with considerable degree of interest on my own part that I came upon sign of this animal, while exploring certain canyons south and west of Kane Springs on the Colorado Desert.

On November 26, 1926, a party from the University of California, Southern

Branch, visited the so-called petrified forest in this neighborhood, and traveling up the canyon for some five or six miles beyond the point known as First Palms, we began to encounter detached specimens, of at first unidentified skeletons, a vertebra, then a limb fragment, sometimes badly bleached or weather worn; finally, however, sufficient material was assembled to identify the animal as a large sheep. In the progress up canyon we finally discovered a complete skull of a ram and came soon upon its decomposed carcass, almost entire; at another point, the skeleton of a lamb of perhaps one year or less age; farther still, the weathered skull of an adult female. This exciting chase finally consummated at a water hole, or what the Mexicans call a *tinaja*, a mere basin in the rock which held rain water. About this *tinaja* the tracks and droppings of sheep were extremely abundant, some of them having been made within the last twelve hours presumably. The water in the hole was very low and extremely offensive in odor. Floating in the water was the carcass of a lamb and stranded on the farther edge under the cliff, the carcass of an adult female. The precipitous sides of the basin were such as to prevent an animal from getting out once it had fallen into the water.

On circling the basin by climbing out of the canyon from a point below we found a gorge above the water hole, of extreme depth and narrowness. At the bottom of this gorge were the remains of two other sheep. One of them showed fracture of the hip bones and parts of the backbone. These various bones were gathered up carefully and brought back to camp. An analysis showed that at least nine individuals were represented in the accumulated mass.

At a point above the water hole on the mountain side, commanding a view both up and down the canyon, there had been built a rock wall about two feet high encircling a little depression in which a man could lie concealed and observe the surrounding country. We searched the vicinity very carefully for empty cartridges or for arrowheads but nothing of that nature was discovered. We have no reason to believe that the animals, whose remains we found, had been slain by man. Their presence in the bottom of the gorge and the fractured pelvis could properly be explained by accident befalling the sheep that had tried to reach the water, driven by the extremity of thirst (if these sheep ever experience thirst) at the end of a long dry season.

Down the cnayon about a mile below the water hole we found evidence of an old camp, cast-off shoes, tin cans and tobacco boxes. In the neighborhood of this camp, after careful search, we found the remains of the legs of one sheep clearly cut off from the fresh carcass. This constitutes the only evidence we have of infraction of the law. All the other sheep found showed no signs of having been slaughtered and no signs of any part having been carried away by man. It is, of course, barely possible that a depraved individual slew them and let them lie. It seems a more plausible explanation that the sheep met their death in attempts to reach water or perhaps even more plausible in case of an animal so wonderfully sure-footed and so incredible a mountain climber, that the sheep remains about the water hole may be in part the result of some disease com-

parable to the hoof and mouth disease that had, at least, reduced their vitality or dulled their judgment and driven them to the vicinity of water where they perished.

The remains of these individuals so far as it was possible to get them back to camp are carefully preserved in the university collection so that they will be available for study by the scientists who may need such material. A second visit to the locality will be made later on to gather up the remains of those that were at that time "unapproachable."

It would seem then that a fair colony of these interesting animals has persisted in these desert ranges, and that at least some of the colony still survive in the neighborhood, and that the individuals make frequent visits to the vicinity of the water hole.—Loye Miller, University of California, Southern Branch, Los Angeles, California.



FIG. 15. Pintail ducks on Victoria Island, San Joaquin County. October 26, 1926. Photograph by Wm. H. Armstrong.

CONSERVATION IN OTHER STATES.

FIVE MAN COMMISSION APPOINTED IN VIRGINIA.

A Commission of Game and Inland Fisheries has replaced the office of Commissioner of Game and Inland Fisheries in Virginia. The five men appointed met for organization last summer and committees were appointed to investigate matters pertaining to pollution of streams and the state game farm. The number of game wardens was reduced to 120 men including the ten supervisors. The plan is to pay the warden force larger salaries and have them devote more of their time to the service. Plans are also being

made to increase the number of game sanctuaries.

DEER IN NEW YORK.

A recent survey of game conditions in the state of New York has shown that there is a shortage of deer in two of the divisions in the northern part of the state. In sections with no open season, the deer have increased to such an extent and are so destructive that an open season is being considered. The deer seem to be moving out of the unprotected districts into the counties where a permanent closed season gives them

sanctuary; however, if the deer increase in these protected areas because of the establishment of more and larger game sanctuaries, it is believed that within a few years, the open season on deer will be state-wide.

OHIO'S AUXILIARY GAME REFUGES.

A report appearing in the November issue of *The Oregon Sportsman* states that the state of Ohio has more than 100,000 acres of game refuges located in seventy-four of the eighty-eight counties of the state. These were obtained and are operated without expense to the taxpayers. They were established by the Division of Fish and Game of the Ohio Department of Agriculture under a system of leasing farms for game refuge purposes. The farms, usually grouped in a compact body, are leased by the state for ten-year periods at a yearly rental of \$1 for each farm.

All shooting, trapping or other disturbance of wild life is prohibited in these refuges and since the lease is for game refuge purposes only and does not interfere with the operation of the farm in any way, farmers have been glad to lease their lands because of the protection afforded against trespassing. This work was begun in 1919 and now eighty-seven such refuges, ranging in size from 500 to 2800 acres, have been established, including about 700 farms in all. These refuges are thoroughly posted and actively patrolled by sixty-five regular game wardens. Not only is the game protected herein, but additional breeding stock is introduced from the game farm so as to make these areas breeding centers for the surrounding unprotected territory.

Superficially, this seems an excellent plan and it would be interesting to know how it works out in detail.

LOUISIANA RICH IN FURBEARERS.

Endowed with exceptionally large areas and cover suitable for fur-bearing animals such as the mink, otter, raccoon, opossum, skunk and muskrat, Louisiana produces more pelts of fur-bearing animals than any other state in the Union, and exceeds in this regard, even combined, the pelt output of all of the provinces of the Dominion of Canada. While the variety of fur-bearing mammals here is not as great as that of the more northern states or in the various provinces of Canada, it is the abundance of the fur-producing species found in Louisiana that places her to the forefront.—*Bulletin No. 13, Dept. of Conservation, Louisiana.*

PROGRESS REPORTED IN WEST VIRGINIA.

The West Virginia Fish and Game Commission has now been in operation for four years. In a ninety-six page report recently issued, splendid progress is shown. Prosecutions have increased from 30 to 1144 and fines from \$605 to \$15,579. Two state forests comprising a total of 16,000 acres have been purchased. A game farm of 327 acres has been purchased and equipped. During the year, 841 pheasants were liberated and 3600 eggs distributed. Sixteen game refuges have been established and 2,000,000 fish planted. In order to give better protection to fish, 200 streams have been closed to fishing. Attention has also been given to pollution matters. Emphasis has been placed upon law enforcement and educational activities and the commission is now run on a budget system.

NEW MEXICO INCREASES REFUGE SYSTEM.

The outstanding achievement in the field of game conservation during the past two years in New Mexico has been the practical completion of the refuge system. In all, fifty-seven refuges have been established, forty-three of which are for big game and fourteen are bird reservations. Of this number, ten have been established during the past two years. The last biennial report of this state estimates the mountain sheep at 150 and the number of antelope at 711. A comprehensive survey of the wild life situation has been undertaken with a trained biologist in charge.

The present officers in charge are attempting to supplant "compliance by force with an educational campaign designed to stimulate an attitude favorable toward the laws and thus toward their voluntary observance."

KANSAS PLANS TO BUILD AND STOCK ARTIFICIAL LAKES.

Kansas recently passed a law which is proving very popular. It provides for the establishment of artificial lakes and makes liberal provision therefor. The plan includes the purchase of two to four lakes each year from the hunting and fishing license fees. Each lake must comprise at least 1000 acres and this is planted with suitable aquatic plants and grass, and is stocked with fish. Kansas has one of the largest hatcheries for warm water game fish and these new lakes will form a proper means of distributing the young game fish. Already 218 applications for such lakes have been

received. As a result of draining operations, it is probable that other states will be forced, in future years, to follow the example of Kansas.

AN ANTARCTIC SANCTUARY.

The French League for the Protection of Birds has awarded its silver medal to M. Etienne Peau, whose mission to the Kerguelen Islands has resulted in the establishment of a national antarctic sanctuary for the protection of many species of birds, including the penguins, which have been massacred wholesale for their skins and oil. The territory embraces Kerguelen Island, the Crozet Archipelago, the Islands of St. Paul and Amsterdam, and Adelie Land. The League is also encouraging the formation of lesser bird reserves in France itself by offering the Prix Magau d'Aubusson, 1926-27, for the creation of *Refuges d'Oiseaux*, provided with nesting-boxes, food-stands, watering-places, plantations, etc.—*Bird Notes and News*, Vol. 12, No. 3.

IN SANCTUARY.

That wild birds learn to know and recognize the fact of their safety in bird-sanctuaries is illustrated by one of the pleasant records of the Fallodon waterfowl sanctuary told in Viscount Grey's delightful new book, "Fallodon Papers." As is well known, the security of the ponds and rough land, planted with suitable trees and shrubs, which are enclosed as a breeding ground for British and foreign ducks in this celebrated sanctuary, attract many wild visitors, especially those which come over the place on migration and hear the familiar calls

of the birds below. Some of these drop down and settle. Of one bird, Lord Grey relates that when he saw it some miles away from Fallodon it took fright at a distance of ninety yards and flew from his approach. When it regained the ponds it showed no fear and became quite tame, evidently knowing where sanctuary and safety existed. This may satisfy the fears of some persons that the tameness learned in a bird-reserve endangers the safety of the birds when outside its boundary.—*Bird Notes and News*, Vol. 12, No. 3.

NEW FEDERAL BIRD REFUGE CREATED IN COLUMBIA RIVER.

A new federal bird reservation, to be known as the Columbia River Bird Refuge, has been created by President Coolidge on two small islands in the Columbia River, at the mouth of the Walla Walla River, Washington, comprising together about eight and a quarter acres of land.

The Biological Survey of the United States Department of Agriculture, under whose jurisdiction the new refuge is placed, has found these rocky islets especially desirable as breeding grounds and safe retreats for wild fowl. From early in winter until the northward migration of wild fowl in the spring the islands have been for years the favorite day-time resting places for hundreds of wild ducks, specially mallards, and wild geese, as well as for gulls, blue herons, and other species in smaller numbers.

The new reservation is not easily accessible to man and already affords waterfowl fairly safe refuge, because the Washington state game law already protects all waterfowl on the Columbia River.

REPORTS.

STATEMENT OF EXPENDITURES FOR THE PERIOD JULY 1, 1926, TO SEPTEMBER 30, 1926,
OF THE SEVENTY-EIGHTH FISCAL YEAR.

	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Executive and legal.....	\$18 00	\$2,711 33	\$198 35		\$2,927 68
Clerical and office.....	250 59	4,650 00	485 60	\$171 98	5,558 17
Rent.....			2,291 47		2,291 47
Telephone and telegraph.....			643 31		643 31
Postage.....			1,269 37		1,269 37
Freight, cartage and express.....			299 60		299 60
Printing.....	239 30				239 30
Automobiles.....	12 60		39 58		52 18
Tahoe camp grounds.....	103 29	566 67	30 88	39 02	739 86
Total administration.....	\$623 78	\$7,928 00	\$5,258 16	\$211 00	\$14,020 94
Education and research:					
Director and assistants.....	\$3 61	\$1,875 00	\$252 49	\$20 00	\$2,151 10
Publicity:					
Director of publicity.....		\$968 00	\$235 10		\$1,203 10
State Fair exhibit.....	\$258 67	415 50	1,568 16	\$2 31	2,244 64
Total publicity.....	\$258 67	\$1,383 50	\$1,803 26	\$2 31	\$3,447 74
Conservation and protection:					
(Patrol and law enforcement)—					
Chief and assistants.....		\$2,299 98	\$128 10	\$5 48	\$2,433 56
Clerical and office.....	\$3 00	998 33	2 65		1,003 98
Rent.....			65 64		65 64
Captains and deputies.....	673 71	36,852 84	28,510 04	96 00	66,132 59
Patrol launches.....	314 77	575 00	245 75		1,135 52
Automobiles.....	154 12		59 51	514 05	727 68
(Protection)—					
Lion hunting.....		405 00	142 88		547 88
Lion bounties.....			1,070 00		1,070 00
Total conservation and protection.....	\$1,145 60	\$41,131 15	\$30,224 57	\$615 53	\$73,116 85
Commercial fisheries:					
Chief and assistants.....	\$6 97	\$2,323 53	\$522 24	\$91 09	\$2,943 83
Deputies.....	11 56	3,037 10	1,022 64	54 90	4,126 20
Laboratory research.....	111 22	7,560 83	533 87	171 76	8,377 68
Statistical.....		1,144 52	35 66	7 36	1,187 54
Patrol launches.....	590 10	255 00	96 30	59 30	1,000 70
Salmon tagging.....	1 60		867 19		868 79
Botulism.....			3,750 00		3,750 00
Total commercial fisheries.....	\$721 45	\$14,320 98	\$6,827 90	\$384 41	\$22,254 74
Fish culture:					
Chief.....		\$949 98	\$24 75		\$974 73
Clerical and office.....	\$12 39	960 00	6 30		978 69
Special field investigation.....	30 53	1,695 00	417 00	\$81 80	2,224 33
Hatcheries.....	16,240 91	21,120 73	2,146 04	658 22	40,165 90
Hatcheries, additions and betterments.....				29,234 69	29,234 69
Automobiles.....	1,043 03		171 70	1,286 50	2,501 23
Rent.....			19 00		19 00
Total fish culture.....	\$17,326 86	\$24,725 71	\$2,784 79	\$31,261 21	\$76,098 57
Screens, ladders and pollution:					
Chief and assistants.....	\$2 20	\$2,205 00	\$852 83	\$190 36	\$3,250 39
Game propagation:					
Game farm.....	\$1,264 94	\$1,935 00	\$541 97	\$127 25	\$3,869 16
Additions and betterments.....				1,372 67	1,372 67
Total game propagation.....	\$1,264 94	\$1,935 00	\$541 97	\$1,499 92	\$5,241 83
License commissions.....			\$9,146 40		\$9,146 40
Total expenditures.....	\$21,347 11	\$95,504 34	\$57,692 37	\$34,184 74	\$208,728 56

STATEMENT OF INCOME FOR THE PERIOD JULY 1, 1926, TO SEPTEMBER 30, 1926.

License sales:	Detail	Total
Angling.....	\$61,735 00	
Hunting.....	50,149 00	
Market fishermen's.....	18,400 00	
Trapping.....	379 00	
Wholesale fish packers' and shell fish dealers'.....	775 00	
Game breeders'.....	52 50	
Fish breeders'.....	35 00	
Total license sales.....		\$131,525 50
Other income:		
Court fines.....	\$11,855 78	
Fish packers' tax.....	3,526 97	
Fish tag sales.....	1,803 03	
Game tag sales.....	5 95	
Miscellaneous sales.....	10 00	
Abalone inspection.....	55 07	
Interest on bank deposits.....	599 98	
Total other income.....		17,856 78
Total income.....		\$149,382 28

VIOLATIONS OF FISH AND GAME LAWS.

GAME CASES.

July-August-September, 1926.

	Number arrests	Fines imposed	Jail sentences, days
Violations of hunting license act.....	65	\$1,240 00	20
Deer: closed season or district.....	23	1,085 00	
Deer: does; fawns; spiked bucks; forked horn bucks in district 12.....	50	2,900 00	300
Deer: overlimit.....	1	150 00	
Deer: failure to produce horns and hide.....	8	400 00	
Deer: evidence of sex removed from hide.....	3	125 00	
Deer meat: sale of.....	1	100 00	
Deer: running with dogs, closed season.....	2	50 00	
Ducks: closed season.....	10	375 00	
Mudhens: closed season.....	2	25 00	
Shorebirds.....	2	75 00	
Doves: closed season.....	22	660 00	
Doves: overlimit.....	6	175 00	
Grouse: closed season.....	1	50 00	
Sage hens: closed season.....	6	300 00	
Pheasants: closed season.....	1	100 00	
Quail: closed season.....	32	1,610 00	10
Non-game birds.....	17	600 00	120
Rabbits: cottontail-brush: closed season.....	49	1,350 00	30
Squirrels, tree: closed season.....	1	25 00	
Shooting game from automobile.....	3	225 00	
Trespass.....	2	65 00	
Night hunting.....	1	100 00	
Game refuges: hunting, possession of firearms.....	12	210 00	
Fur trapping regulations.....	2	35 00	
Totals.....	322	\$12,030 00	480

FISH CASES.

July-August-September, 1926.

	Number arrests	Fines imposed	Jail sentences, days
Violations of Angling License Act.....	11	\$150 00	180
Violations of Commercial Fishing License Act.....	7	80 00	
Trout: closed season or district.....	2	100 00	
Trout: buy or sell.....	4	120 00	
Trout: overlimit.....	14	550 00	
Trout: taken other than with hook and line.....	2	50 00	
Striped bass: undersized, overlimit.....	30	710 00	150
Striped bass: sale, closed season.....	2	50 00	
Crabs: transportation from district 1 1/2.....	3	300 00	75
Crabs: meat not in shell, undersized.....	2	45 00	
Crabs: closed season.....	1	20 00	
Clams: overlimit, undersized.....	18	805 00	40
Abalones: undersized, dried.....	31	845 00	
Lobsters: closed season.....	10	325 00	
Spot fin croaker: offering for sale.....	1	25 00	
Barracuda: undersized.....	5	105 00	
Black bass: undersized, sale.....	3	95 00	
Sunfish: overlimit.....	1	25 00	
Illegal fishing: 300 feet of inlet to lake, 250 feet of lower side of dam.....	3	30 00	
Illegal night fishing.....	1	25 00	
Nets: illegal possession or use.....	13	1,225 00	50
Totals	164	\$5,680 00	495

Seizures of Fish and Game.

July-August-September, 1926.

Ducks	6	Black bass	20
Doves	243	Sunfish	84
Mudhens	1	Catfish	1
Shore birds	4	Salmon, pounds	750
Quail	35	Barracuda, pounds	1002
Sage hens	31	Spotfin croaker, pounds	125
Non-game birds	30	Pismo clams	686
Deer meat, pounds.....	3174	Crabs	693
Doe hides	1	Crab meat, out of shell, pounds.....	360
Buck heads	1	Shrimp meat, pounds.....	10
Spike buck, hide and antlers.....	1	Abalones	23
Rabbits	59	Split tails	2
Squirrels	4	Lobsters, pounds	150
Trout	284	Nets	12
Striped bass, pounds.....	686		

CORRECTION CALIFORNIA FRESH FISHERY PRODUCTS REPORTS.

April, May and June, 1926.

In the October, 1926, issue of California Fish and Game, California Fishery Products Report for the months of April, May and June should be corrected to read as follows:

Mendocino, Sonoma and Lake counties: Cultus Cod, 3563 lbs., Sandabs, 7150 lbs., Sole, 67,840 lbs., Total, 290,161 lbs.

Marin County: Smelt, 11,655 lbs., Turbot, 995 lbs., Total, 382,902 lbs.

Solano and Yolo counties: Salmon, 34,469 lbs., Shad, Buck, 37,157 lbs., Shad, Roe, 40,086 lbs., Striped Bass, 8042 lbs., Total, 122,903 lbs.

Sacramento and San Joaquin counties: Salmon, 145,216 lbs., Shad, Buck, 21,121 lbs., Shad, Roe, 20,642 lbs., Striped Bass, 49,736 lbs., Total, 259,661 lbs.

San Francisco and San Mateo counties: Smelt, 23,866 lbs., Mussels, 3145 lbs., Total 3,429,399 lbs.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JULY, AUGUST AND SEPTEMBER, 1926
Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of Fish	Del Norte Humboldt.....	Mendocino, Sonoma, Lake...	Marin.....	Solano, Yolo.....	Sacramento, San Joaquin.....	Alameda, Contra Costa...	San Francisco, San Mateo.....	Santa Cruz.....	Monterey.....	San Luis Obispo, Santa Barbara, Ventura.....	Los Angeles.....	Orange.....	San Diego, Imperial.....	Total.....	Mexican, brought into California via Los Angeles...	Mexican, brought into California via San Diego...	Total Mexican brought into California.....
Albacore.....							3,400				1,521,205	556	417,214	1,940,703			
Anchovies.....									1,728		63,184			69,559			
Barracuda.....								17,524	37,887		349,263	3,261	475,952	889,374	170,496	352,860	
Bonito.....								15,029	30,606		2,094,876	1,642	197,323	2,353,260	8,352	13,839	
Carp.....											4,200			4,955			
Catfish.....		938												30,693			
Cultus Cod.....	21,000	6,309							11,421	130				190,784			
Flounders.....	300										902			220,642			
Grayfish.....											11,668	12	90,673	114,748			
Hake.....														20,035			
Hallbut.....														347,904			
Kingfish.....	108,186	14,033							8,174	64,711	57,857	680	9,270	75,027	11,162	235,104	246,356
Mackerel.....									14,733		32,543		343	75,027			
Mackerel, Marlin, Mackerel, Horse.....									170,060	7,314	318,794	28,613	37,253	617,775	744	744	
Mullett.....									24,827		67,511			92,338	2,320		2,320
Perch.....	5,909	200	8,420						2,194				3,088	3,553			
Pike.....					11	51					11,249	485	1,778	56,913			
Pompano.....									81					62			
Rock Bass.....														119			
Rockfish.....	27,414	1,116												220,220	436	436	
Sablefish.....	20,718													1,290,275			
Salmon.....	1,502,198	793,207							287	8	343,621	2,338	189,889	24,382			
Sandbars.....														4,000,192			
Sardines.....														239,348			
Sculpin.....														40,032,647			
Sea Bass—Black.....														528			
Sea Bass—White.....														28,186			
Shad.....														38,427			
Sheepshead.....														1,121,246	15,982	180,313	196,295
Skates.....														1,834			
Striped Bass.....														25,308	1,245	1,245	
Sturgeon.....														37,977			
Striped Bass.....														12,642,409	1,011,957	1,454,487	
Smelt.....	5,277													204,190	100	100	657
Sole.....	1,440	97	5,642											2,057,261	557	557	
Sprat.....														25			
Spittail.....														565			
Striped Bass.....														111,603			

